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MOTOR AGE

MOTOR IDEAS OF JOHN BULL FOR NEXT YEAR

LONDON, Nov. 9.—The attendance at Olympia bids fair to exceed all records. The few days that have already elapsed since the opening have resulted in an excess of numbers over any previous show. The chief builders' stands, such as Wolseley, Daimler, Rolls-Royce, Napier, are besieged by an incessant body of sightseers, and it is really only possible to get a real view of some exhibits in the early morning. Considerable interest is being evinced in the new engines in which the Knight principle is incorporated, and a few words describing the difference in these models from the original Daimler may prove interesting.

Dealing firstly with the Mercedes model, the bore of the cylinders is 40 m.m. and the stroke 130 m.m. (1.57 by 5.11 inches). The Daimler company adopted chains for the driving of the half time shaft. That method is not exploited by the Mercedes company, which employs ordinary spur wheels, the driving pinion being fixed at the center of the crankshaft.

The lubrication system adopted is also different. With the Mercedes a forced mechanical system is employed; oil is drawn up from a sump formed below the bottom of the crankcase, and forced through the main bearings to the hollow crankshaft. There is also a branch pipe from the pump that leads to the cylinder walls for feeding the sleeves. Two wells are situated at the bottom of the crankcase, one of which contains fresh oil, and at each stroke of the pump a supply of fresh oil is sent into the second well or sump, so that the supply is kept constant. The amount of oil pumped is controlled from the throttle.

The cylinders are cast in pairs, and ignition employed is Eisemann governed type, which advances the firing moment as the speed of the engine increases.

The Panhard-Knight has its cylinders cast separately, and is 100 millimeters bore by 140 millimeters stroke (3.93 by 5.51 inches). The lubrication system on this chassis is arranged on novel lines. The oil pump is situated at the dash end of the sleeve or eccentric shaft, and the lubricant is carried within a tank placed under the dash. The pump delivers the oil at one stroke to sight feeds on the dash, a by-pass being provided to return the surplus oil to the tank. The oil from the sights passes to the other end of the pump, and on the return stroke is forced to the main bearings and sleeves. The oil, it will be noticed, is not reused. The Krebs type of carbureter is in vogue, which is constructed to regulate the flow of gasoline by means of a needle valve connected to the diaphragm valve.

The Panhard firm have introduced also a new model fitted with a six-cylinder motor, 80 m.m. bore by 120 m.m. stroke (3.14 by 4.72 inches), in which the cylinders are cast in one block. The crankshaft has four plain bearings and the usual pump circulation is provided. The firing point is not variable.

This company exhibits two models fitted with Knight motors, having one and two cylinders respectively. The former has a bore of 101.5 millimeters and stroke 130

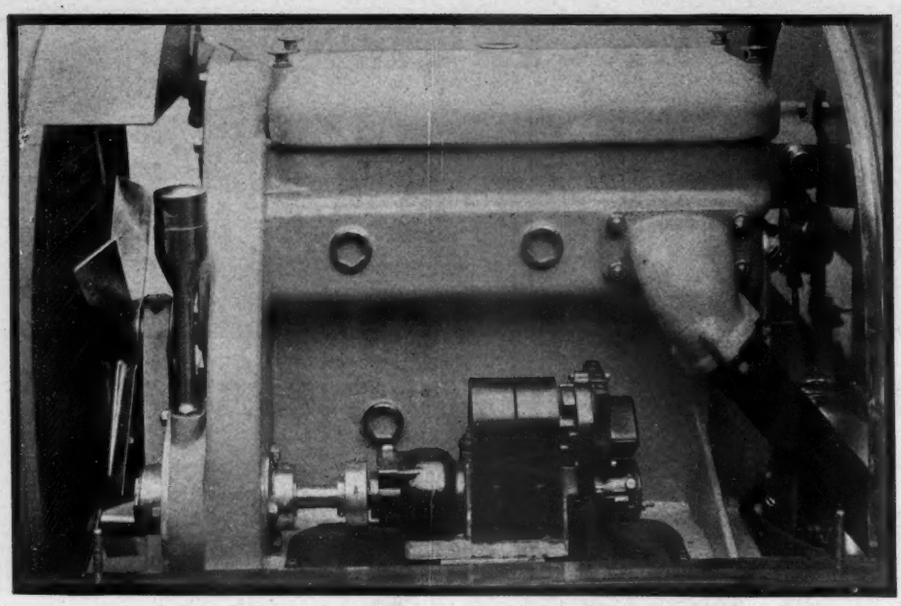

FIG. 1—NEW GERMAIN VALVE-IN-THE-HEAD MOTOR

millimeters (3.9 by 5.1 inches), and develops 9-horsepower at normal speed. The two-cylinder engine has a bore of 96 millimetres and stroke 130 millimetres (3.7 by 5.1 inches). This car differs from previous Rover models inasmuch as the gearbox does not form a unit with the engine, the engine being fixed to the longitudinal members of the frame, and a universal joint fitted between the engine and gearbox. The cylinders are cast together, with the magneto set at right angles to the crankshaft. The carbureter is of the Daimler, multiple-jet type, and the oiling gear is also on the Daimler system. Three speeds are given by the gearbox, and overhead worm is the form of final drive. The propeller shaft is encased in a tube which acts as both torque and radius rod.

The Minerva-Knights are arranged with the same oiling arrangement as the Daimlers. In all models four speeds are provided, and also an accelerator pedal. With the Daimlers only three speeds are available and no accelerator pedal is fitted. The Minerva cars are all bevel driven, and the propeller shafts are encased in a tube that terminates in a fork at the forward end.

Slab-Sided Motors

There seems to be a distinct tendency to construct what I may term slab motors; that is, motors which have a slab-like appearance, obtained by the closing in of the valve spindles and springs, and by casting the intake manifold and the exhaust manifold within the monobloc casting. A good example of this kind of motor is the Germain, although in this instance the valves are arranged at the top of the cylinders.

And the engine presents so much that is novel in its design that it is proposed in the casting is not visible in either of the illustrations, being situated behind the magneto. There is much to be admired in the design of this engine, though one does not care very much for the use of cages to describe it rather fully, more especially as to the arrangement of its valves. First it will be well to note, however, that the cylinders, four in number, have a bore of 80 millimetres, and that the piston stroke is 130 millimetres (3.14 by 5.1 inches); that the cooling is by thermo-syphon system; that ignition is by high-tension magneto and that the camshaft and valves are over the cylinder tops. Fig. 3, which

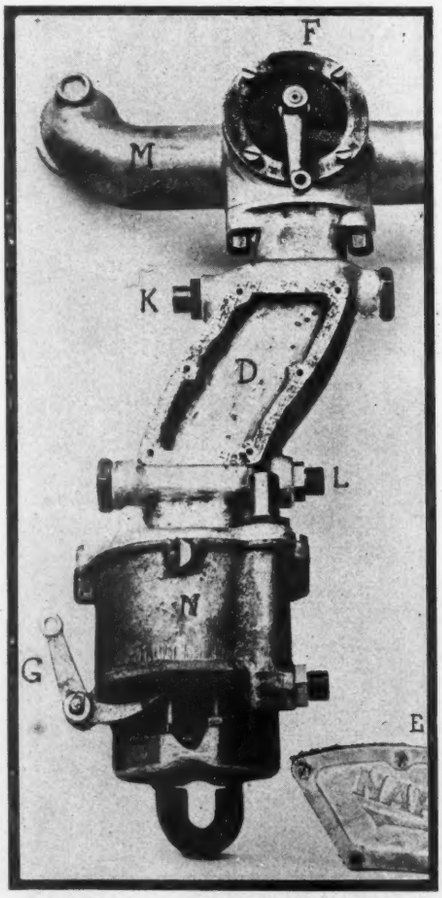

FIG. 2—NAPIER CARBURETER

shows a side view of the engine from the carbureter side, also shows the top cover removed, exposing the rocking levers, camshaft, valve boxes, etc., though these are not all visible in the illustration. A study of the sketch should prove instructive to American engineers.

The valves, both exhaust and inlet, are in cages and are dropped into openings to receive them immediately over the combustion chambers. The upper ends of these circular openings have female threads cut in them and cylindrical domes which entirely enclose the valve springs are screwed down onto the valves boxes to retain them pressure tight on their seats. The domes through which the valve spindles project have their upper ends notched to receive a special spanner; the notched tops of these domes are plainly visible in the illustration. So much for the valves; now as to their method of operation:

One-Piece Camshaft

The camshaft, which is in one piece, extends the entire length of the box-shaped well and lies snugly between the valve domes. The four bearings are not split ones, the camshaft has therefore to be introduced endways, necessitating rather large-diameter bearings; the journals on the shaft take in consequence the form of collars. Immediately over the camshaft bearings are the brackets for the rocking levers. In the figure the brackets are shown and the tapped ends of the rocking levers also. It will be seen that these latter are grouped in fours and that each bracket is held by four studs. By the removal of four nuts each bracket, together with its group of rocking levers, comes away and leaves its set of four valves entirely accessible for removal. The arrangement is very neat, though the valves are not quite as readily accessible as with the more usual type of engine. There is, however, as a rule, some difficulty in engines of this character in designing a really accessible valve and valve gear which is practical.

The camshaft is driven by chain, the casing for which is visible in Fig. 1, which represents a view of the engine from the magneto side. This view also shows the valve gear cover in place and it will be noticed how very pleasing an appearance the whole engine takes. In the same figure may be seen the high-tension magneto, which is as well driven by chain, the casing for same being visible. There is a point in connection with the carbureter which must be remarked on; part of its supply of air is drawn through a transverse pipe passing through the water-jacket—the pipe is internally ribbed—such air being of course heated. The opening for the exhaust valves when such devices can be avoided. These, however, do not cause a great amount of trouble if well designed, as the ones under discussion undoubtedly are. There is no doubt that the

15-horsepower Germain is quite one of the most interesting engines at Olympia from the point of view of novelty of design. Engineers at least see mto find it so, for the car excites lively interest among the fraternity.

Napier Gearshaft Mechanism

The Napier exhibit displays what appears to be a very novel and certainly a very interesting device in connection with the gear changing mechanism of the cars. The internal arrangement of the shafts and gears within the gearbox is such that when the top speed is in action no gears are in mesh and the layshaft is consequently idle. Now this part of the system is not of course new, it however tends greatly towards a silent drive on the top speed. When it becomes necessary to drop to a lower gear a rapidly revolving wheel wheel on the mainshaft has to engage with a stationary one on the layshaft, resulting in the well known grinding noise that occurs while the layshaft is being set in motion. Now in the new system this idle shaft is set in motion by hand, or to put it more clearly, by a movement of the gear change lever.

The external construction is made clear by means of the two illustrations, Figs. 4 and 5. Referring to these illustrations, A is the hollow selector shaft, which has attached to its end the bracket B, which in turn engages with the change speed lever. This lever is pivoted at its lower end and a short distance from this end is a yoke having small projections J, which engage in slipper blocks, which in their turn are mounted on a steel shaft. This steel shaft passes through the hollow selector shaft, and it is by the longitudinal movement of this shaft which throws a small pinion into work—actuated when the change speed lever is moved from side to side in the gate—that motion is given to the layshaft and its wheels as and when required.

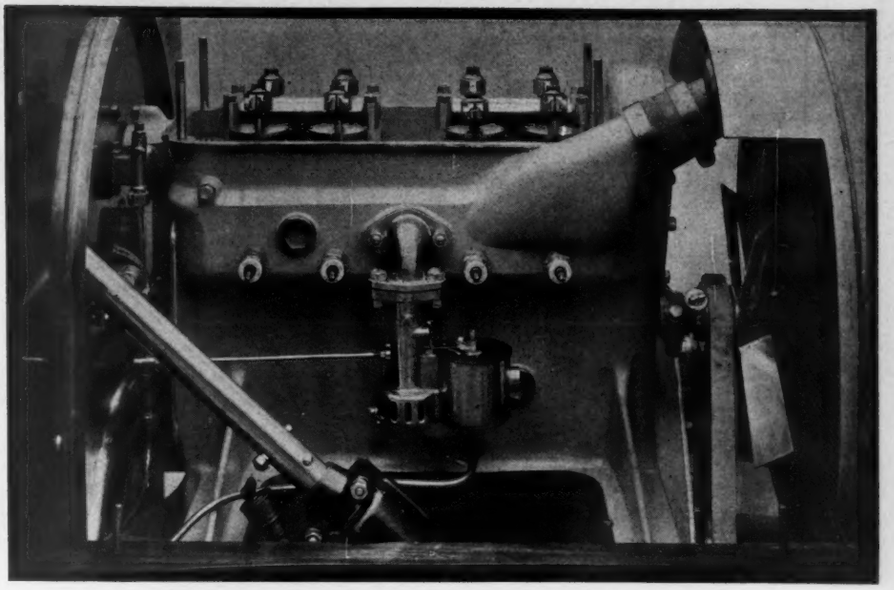

FIG. 3—GERMAIN MOTOR WITH ROCKER ARM COVERS REMOVED

A rather neat safety locking device is fitted to these cars as well, a device for preventing the gear change lever passing into the reverse notch when the spring, which is of the ratchet type, is in operation.

In both the illustrations will be seen at the rearward end of the gate quadrant a small T-shaped handle E. This handle by a revolving movement of 90 degrees brings a pawl into engagement with the ratchet wheel occupying the usual position, at the same time a small locking bar is thrown across the reverse slot, thus making it impossible for an absent minded driver to engage the reverse wheels while the shafts are to all intents and purposes locked by the engagement of the pawl with the ratchet wheel. It will be well to remind that this system is not a new one. The details of the design are, however, well carried out and therefore the device has received mention.

The Napier Carbureter

Fig. 2 shows an external view of the latest design of 15-horsepower Napier carbureter. There are two jets included in the design and the float is an annular one contained within the float chamber N. The gasoline vapor from the jets passes along two distinct channels within the exhaust jacket D, the cover of which is shown separately at E. The smaller jet of the two—the left hand one in the figure—has choke tubes in duplicate, one of which can be raised and lowered by means of the bellcrank lever G. In this manner is the air supply cut down at starting. The exhaust jacket is fed through the inner and outlet unions K and L respectively.

It will be seen that the throttle F communicating with the intake pipes M M is a semi-rotary one and the ports cut in it are peculiar and are arranged so that at nearly closed throttle position the right hand jet is entirely inoperative and the left hand jet, which it will be remembered has adjustable air supply, is depended upon. As the throttle is opened up to give accelerated engine speed both jets come into play. The Napier company, in the design of this carbureter, has eliminated all automatically moving parts, dashpots, valves, etc., which seeing that these are in many cases uncertain in action is perhaps a step in the right direction. The results obtained from the carbureter have been so far excellent and its capabilities are 21 miles to the gallon, as has been proven in more than one demonstration on the roads of the United Kingdom.

The Limit Carbureters

The subject of carburetion is such an important one in the working of the explosion motor, and it is so comparatively

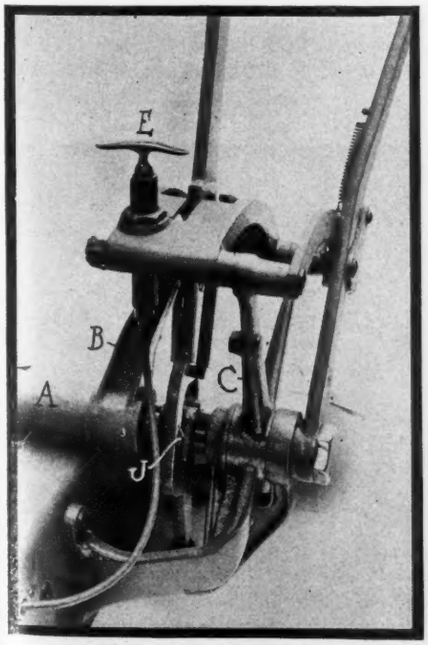

FIG. 4—NAPIER GEARSHIFT

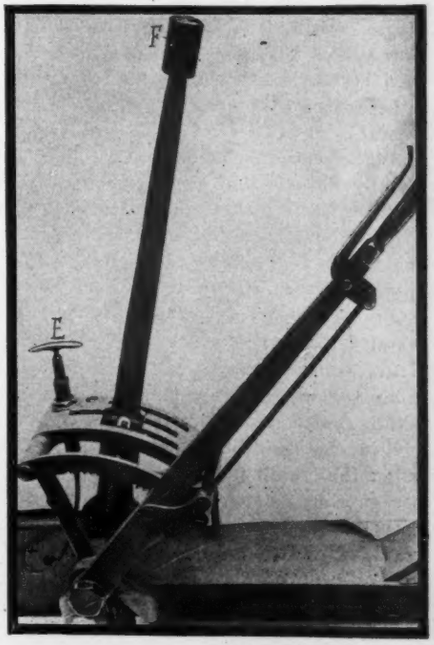

FIG. 5—NAPIER GEARSHIFT

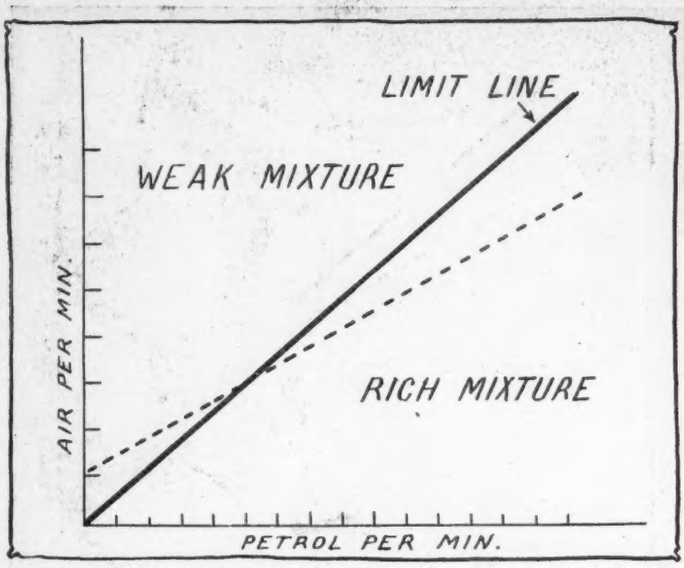

FIG. 7—CHART SHOWING PRINCIPLE OF LIMIT CARBURETER

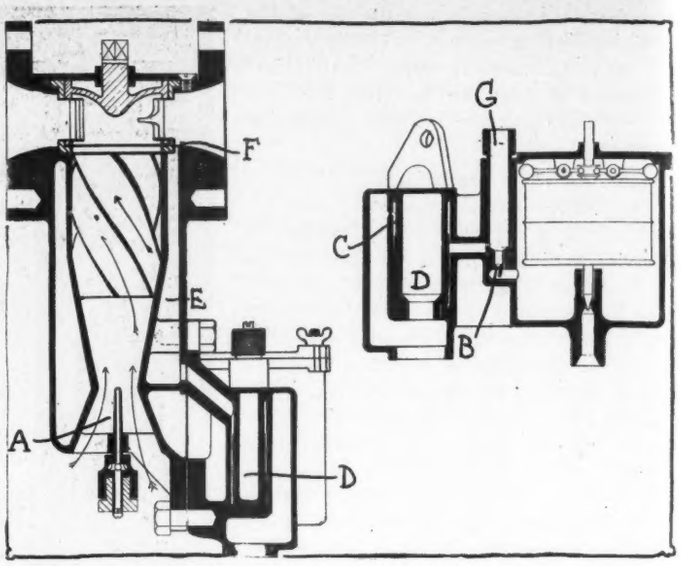

FIG. 8—SECTION OF THE LIMIT CARBURETER

seldom that one remarks any really new idea in carbureter principle, that it is proposed to describe the one illustrated in Fig. 8 pretty fully. This apparatus is known as the limit carbureter and it may be said to combine the spray and the surface system of carburation to some extent, although in regard to the latter vaporisation is really caused more by contact with heated surfaces than by exposure to a current of air. If one considers an elementary form of carbureter having a choke tube and jet only it is well known that the mixture variation at different speeds is very considerable. The diagram represented in Fig. 7 is interesting in this respect. The full diagonal line shows the limit line—a line representing the correct proportions of gas and air at all speeds and with which the perfect carbureter should correspond. The dotted line shows the mixture given by an actual carbureter under test and a glance at the diagram will make it clear that at very slow speeds the mixture is poor and that at a certain exact number of revolutions it becomes perfect, finally falling off considerably in quality, due to jet friction and other causes. The extra air valve has usually the effect of complicating matters with regard to the question of correct mixture, without, however, very much improving them. It has been the aim of the designers of the limit to overcome these obparts as air valves, springs, dashpot, diaphragms and so on.

Reference to Fig. 8 will show that besides the usual jet A is a small-gauged orifice B also communicating with the supply in the float chamber. As B stands below the gasoline level in the float chamber gasoline flows through the horizontal ports thrown into the narrow annular chamber C, where it is to some extent vaporized by the heat of the jacket water in D. This vapor passes along the sloping port shown into the chamber E, whence it is led into the engine inlet pipe through a small duct F. Now it will be understood that the main gasoline supply enters through the jet A, which is of such calibre, however, that under no circumstances can an excess of gasoline pass. When the exigencies of engine speed require additional gasoline this addition is made by way of the small orifice B in the lower end of the limiting tube G, such supply being gassified by passing into the hot chamber C surrounding the plug D, which latter, by the way, has a thread cut on its exterior with a view to increasing surface. The makers claim that this already vaporized gasoline passing finally through the aperture F and mixing with the main gas and air supply performs just in the required manner, both at starting up and at accelerated speeds, in maintaining a perfectly constant explosive mixture.

Optional Brakes on Arrol-Johnson

A good example of the power unit system is that of the Arrol-Johnson company, Fig. 9. The engine has cylinders 80 millimetres bore by 120 stroke (5.14 by 4 inches). Thermo-syphon cooling is employed, and a very large-diameter out take pipe on the top of the cylinders. The Renault type of radiator is employed, and the fan is arranged around the periphery of the flywheel. Four speeds are provided, giving the following ratios at 1,000 revolutions per minute:

	Miles Per Hour
First	6.6
Second	10.6
Third	15.6
Fourth	23.8

The change-speed lever is arranged within the frame. Detachable steel wheels are fitted and front wheel brakes are fitted if desired, purchasers having the option of front wheel brakes or the usual type of counter shaft brake. The clutch consists of three metal plates held in contact by spring pressure working in an oil bath and the coupling between the clutch and gearbox is by rigid detached coupling.

The Arrol-Johnson company exhibits a neat form of valve tappet, the idea obviously being to reduce the noise and clatter which these parts are liable to cause to a minimum. Fig. 10 shows a sectional view of the tappet together with its guide. The adjustable top A is recessed and is fitted with a fibre pad which makes practically silent contact with the

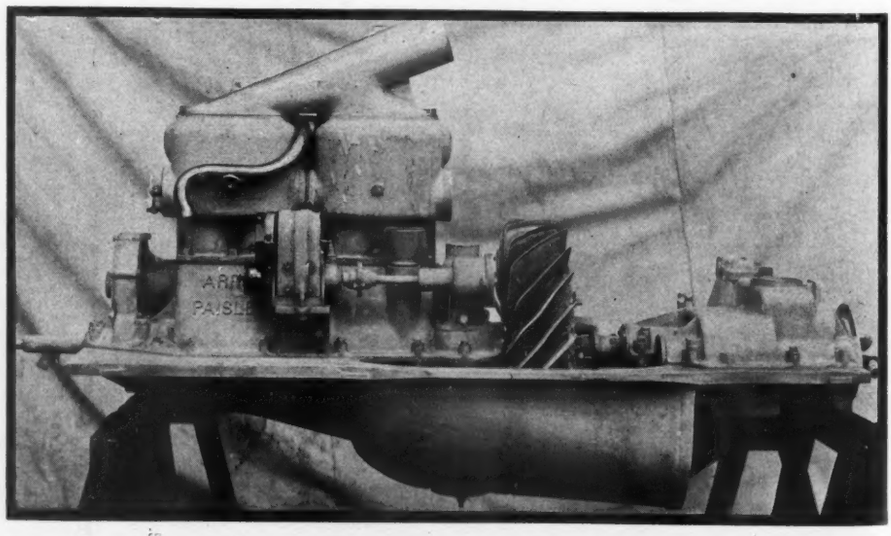

FIG. 9—UNIT POWER AND GEARBOX ON THE ARROL-JOHNSON CARS

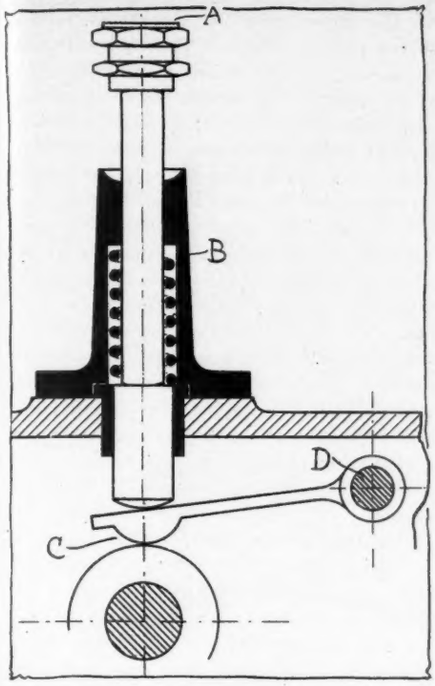

FIG. 10—VALVE TAPPETS ON ARROL-JOHNSON CAR

valve stem at each lift of the valve. In addition to this a spring B is fitted in the hollow part of the guide, preventing the tendency which a free tappet has to rapidly vibrate between the valve stem and the cam. In order to reduce wear of the tappet on its guide to a minimum and so as to obviate noise even after months of work, the tappet does not bear directly upon its cam but upon a small radius link with a nose C and a pivot at D. The push on the tappet is in consequence practically in line with its axis and the tappet is free from the tendency to jam which the more usual type possesses. This carefully designed piece of mechanism is interesting in that it constitutes one of many attempts to silence the poppet valve and to strengthen its position against its rivals, the sleeve valve, the piston valve, the rotary valve and others.

This company fits as well a neat parallel-motion mechanism for preventing extravagant body side sway. It is not at all usual to find any special arrangement provided for relieving the springs of the side strains put upon them by a heavy

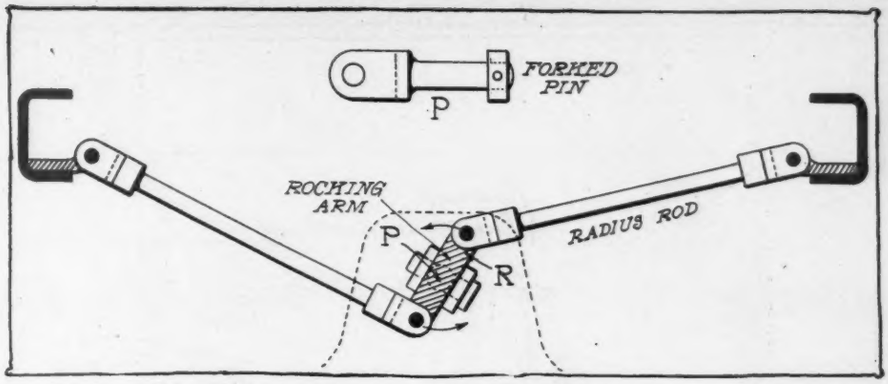

FIG. 11—ANTI-SWAY DEVICE ON ARROL-JOHNSON CARS

body when rounding corners. This device, therefore, a diagrammatical sketch of which appears in Fig. 11, is of much interest. A fork ended pin swivels in a boss formed on the front end of the rear axle casing. To the fork is pivoted centrally a rocking arm R. Each end of the rocking arm is coupled to one side member of the frame by a radius rod, small brackets being riveted to the frame for the purpose. With this simple arrangement it is not possible for the frame to move laterally with respect to the rear axle casing and wheels, though it—the frame—is perfectly free to ride vertically on the supporting springs. Some such arrangement as this, which appears almost essential when the body work is heavy, would seem in any case to relieve the springs and their shackles of a deal of work which they are unsuited to perform and should assist in abolishing some of those squeaks and rattles which in these days of silent engines are usually so audible and so difficult to locate.

On the Lanchester 38-horsepower cars is seen a side brake compensating arrangement which strikes one at once as a novel feature. The method of compensating the pull on the two sets of brake shoes by means of a continuous wire rope R, Fig. 12, has of course been standard practice with a number of makers for some considerable time. But the usual method in which the wire passes through the hollow brake shaft is open to the objection that it is necessary to affix the attachment fitting after the catch has been threaded through the tubular shaft. This obviously may have objections. In the Lanchester design the cable instead of passing through the shaft takes a position outside and is held or guided centrally by a hook-shaped casting C. This arrangement of the wire has two advantages over the older one. Firstly, as mentioned above, the attachment fittings can be affixed more conveniently and secondly—and this is perhaps of more importance—the radii of the curved guides G round which the wire passes from side to side of the frame are considerably larger than is usual when the wire merely passes through a bell-mouthed opening in the end of the hollow shaft. This fact will be made clear on looking at the illustration. The larger radius allows more correct compensation and has much less tendency to wear the wire rope.

A very simple and ingenious adjustment for the accelerator pedal has been introduced by the Lanchester company. On the part of the shaft which takes the accelerator lever C, Fig. 13, is cut a worm sector A, the teeth of which engage with the thread of the usual clamping bolt B. On releasing the clamping nut D the bolt

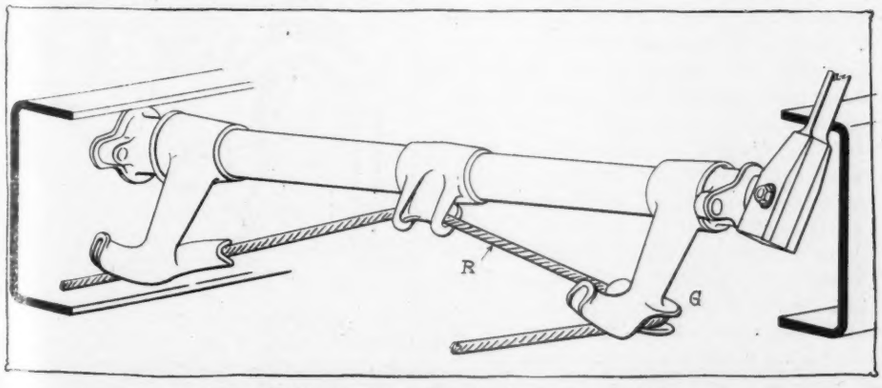

FIG. 12—CABLE BRAKE-EQUALIZER ON LANCHESTER

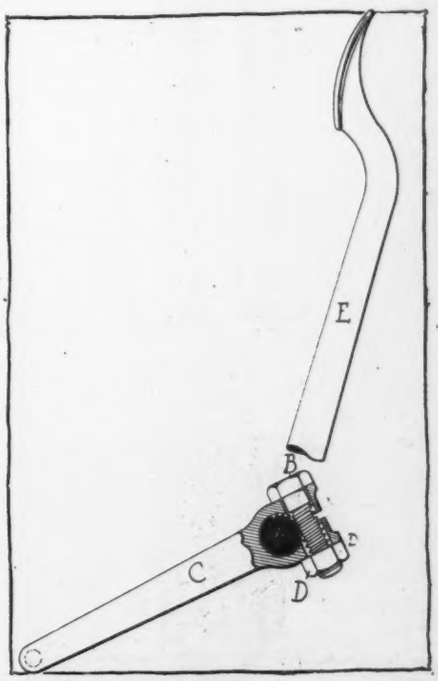

FIG. 13—LANCHESTER ADJUSTABLE PEDAL

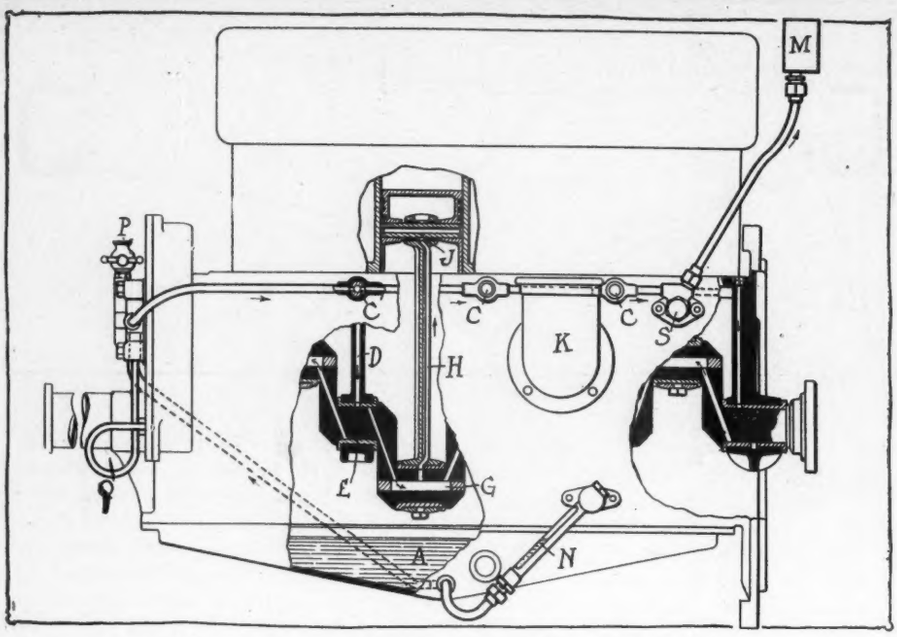

FIG. 14—SECTION OF CROSSLEY ENGINE, SHOWING OILING SCHEME

can be turned and—acting for the time being as a worm—alters the relative position of accelerator pedal E and lever. After correct adjustment has been obtained the clamping bolt is secured in the usual way.

The new Crossley chassis has a number of interesting points included in its design, and as the Crossley company builds a type which may be considered fairly representative of first-class British design, it will be well to give here a pretty full and detailed description. In the motor are three points of interest—the lubrication system, the valve-operating mechanism and the carbureter. Fig. 14 shows diagrammatically the lubrication arrangement which is in use. The lower portion of the crankcase forms a somewhat commodious sump A, which is filled by means of the filler K. The level of oil in the sump can be ascertained by the inclined gauge glass N. The inclination of the gauge glass is for two reasons; first that it may be more readily viewed from above, and second that slight differences of level may be more easy of discernment. A small gear pump B is attached to the front gear cover plate. The pump induces oil from the sump by way of the slanting pipe and delivers it into a horizontal pipe having three leads marked C. The oil flows down the drilled holes D and lubricates the crankshaft journals. The connecting rod is served with lubricant through the crank webs, which communicate, as will be seen, with centrally drilled holes G in the crank pins. Oil is fed from the pockets formed by these holes on to the bearing surfaces of the crankpins and as well by small pipes H passing along the connecting rods to the piston pins. Many makers appear to consider this latter unnecessary. It must, however, be regarded as an additional safeguard against possible trouble. At the rear end of the engine is a gauge M for ascertaining the oil pressure and it is understood that the makers intend that a pressure of 5 pounds to the square inch shall be the normal one adapted, and to insure this state of affairs they attach a relief valve S which passes any superfluous oil back into the sump.

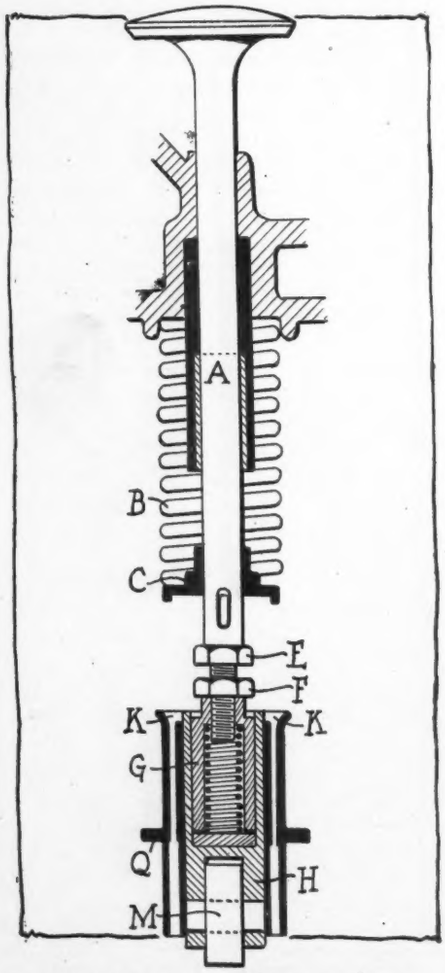

FIG. 15—CROSSLEY TAPPET DESIGN

Fig. 15 shows in detail the construction of the valve-operating mechanism. The tappet piece H which is provided with the usual anti-friction roller M is bored out at its upper end to receive the small spring operated plunger G. It is usual practice to allow slight clearances between the bottom of the valve stem and the set screw E; owing to the presence of a spring in the plunger the clearance occurs in the Crossley tappet between the plunger G and the tappet piece H and this space is intended to serve to some extent as a dash pot. The fact that the necessary clearance between valve stem and its operating piece occurs at a point contained within the tappet and in the presence of lubricant doubtless accounts in a great measure for the silent running of these engines.

The third item of interest is the carbureter. A section shown in Fig. 16 Inside the vertical dashpot chamber A is a light piston B normally held in the position shown in the diagram by a light coiled spring C. The dash pot piston has an extension in the shape of a piston valve which serves to open and close the ports D. There is a small spindle F screwed centrally into the extended part of the piston, which spindle has an adjustable nose on its lower end. The gasoline spraying nozzle is shown at K and it will be understood that the passage R communicates with the interior of the float chamber. It is here that the novel feature of the apparatus is to be observed, for the opening in the nozzle is a tapered one and carries a light tapered spindle H, which is permitted to slide up and down in a guide. Now the tapered needle and the nose F, which is attached to, and consequently has the same movement as, the dash piston are coupled together through the medium of the working arm G. This arrangement gives a correct mixture at all speeds, for as the pull in the inlet pipe increases, due to increased engine speed, the piston B drops, admitting air through the ports D and the nose piece

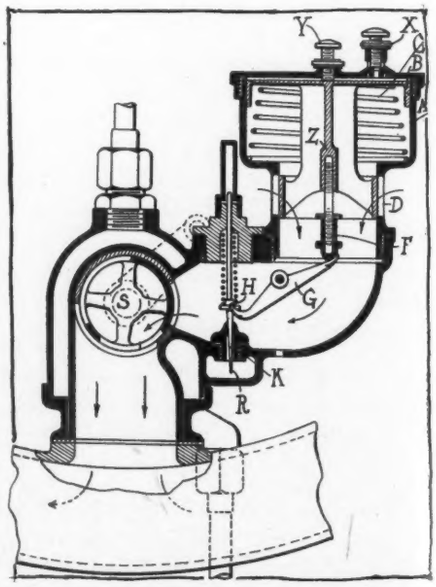

FIG. 16—THE CROSSLEY CARBURETER

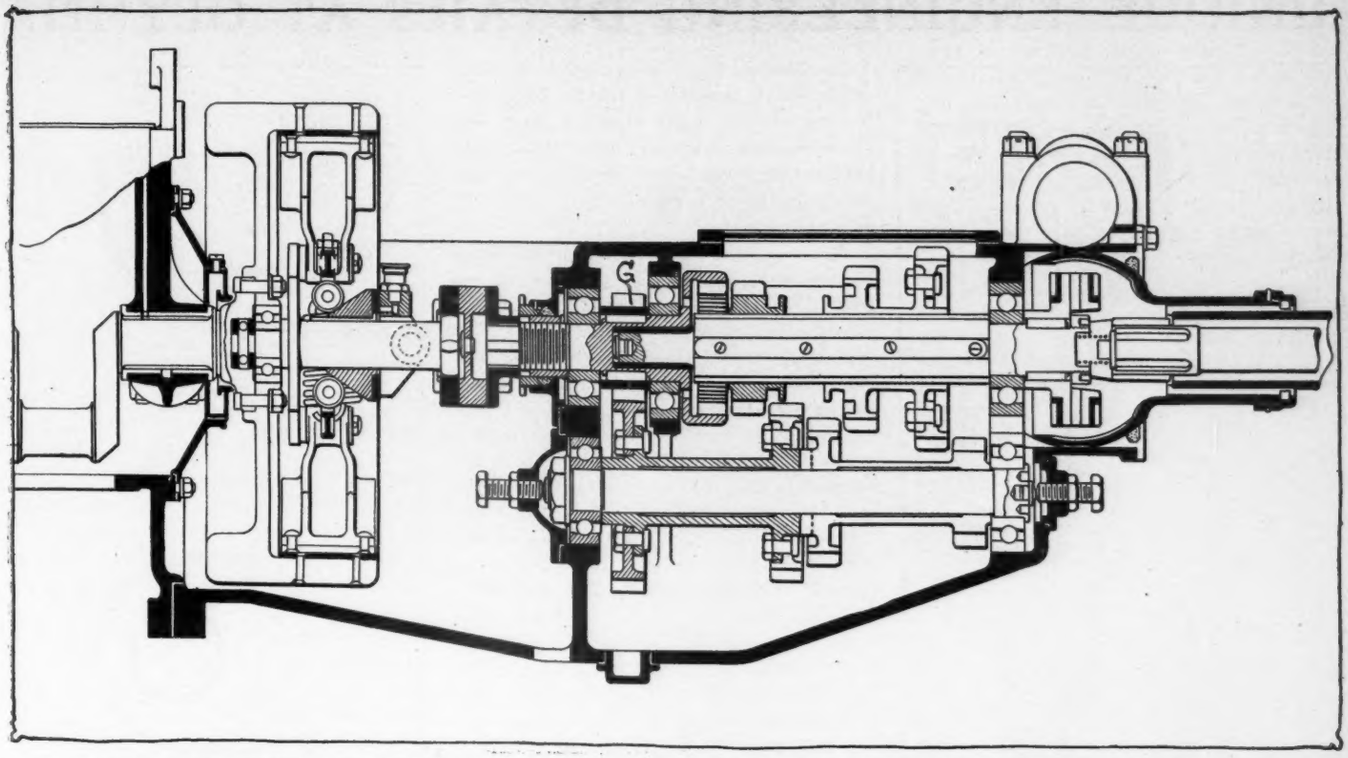

FIG. 19—NEW ENGINE RADIUS ROD DESIGN

FIG. 17—CROSSLEY CLUTCH AND GEARBOX, SHOWING DETAILS OF BEARINGS

acting through the arm G lifts the needle H, thus allowing more gasoline to pass.

On the cover of the dash chamber will be seen two adjusting screws and these are of vital importance in the working of the carbureter. The centrally placed screw Y limits the stroke of the dash piston and the other marked X controls the inflow of air to the dash chamber. It is the practice of the makers to carefully adjust these by trial in the works as well as on the road and the owner is recommended not under any circumstances to interfere with them. It should be noted that a semi-rotary throttle valve is employed, which in the figure is indicated in a closed position.

The Crossley gearbox, Fig. 17, exhibits sound and substantial design. The drive can be clearly followed through the crank-shaft A, the flywheel B, the clutch C, the clutch shaft D to the universal joint E. The latter drives the primary shaft F. The gear G, which intrinsically forms part of the primary shaft, is in constant engagement with the gear I on the secondary shaft, which revolves at half-engine speed. In order to be clear it may be well to take the speeds in turn and notice through which wheels the drive is carried. The first-speed drive, then, is conveyed through G. I. Q. O., the second through G. I. N. M., the third through G. I. L. K., and the fourth through J. K. The latter is of course a direct drive and the secondary shaft runs idle.

An entirely new type of front-wheel brake finds a place on the new Crossley cars, and it will be possible with the aid of the lettered diagrams, Fig. 18, to make the details clear. First it must be noted that the design is such that the center line of the steering swivel pins corresponds with the wheel centers as a whole so that any tendency for the car to swerve from its course, owing to uneven braking effort, is altogether eliminated. This much to the desired end must naturally tend to complicate details somewhat but there is little doubt that the end justifies the means. Now to describe the brake. The shaft A which extends across the chassis is operated by a pedal; on each end is keyed a trigger B. The trigger depresses a pin C, passing centrally through the steering pivot pin at its upper end. This pin acts upon a small rocking lever D, which in turn rotates the circular cam E in an anti-clock-wise direction. The cam in rotating, through the medium of the roller F, presses the 4 brake shoes G against the inner circumferential surface of the brake drum H, thus applying the brake. To release the brake shoes the tension springs shown are brought into play, and moreover, as the shoes rock on pivots K the return motion of the cam brings the rollers into contact with the short overhanging ends of the shoes, thus releasing the latter from contact with the drums. The wire wheel M can be easily removed and a special spanner is provided for the purpose by the manufacturers.

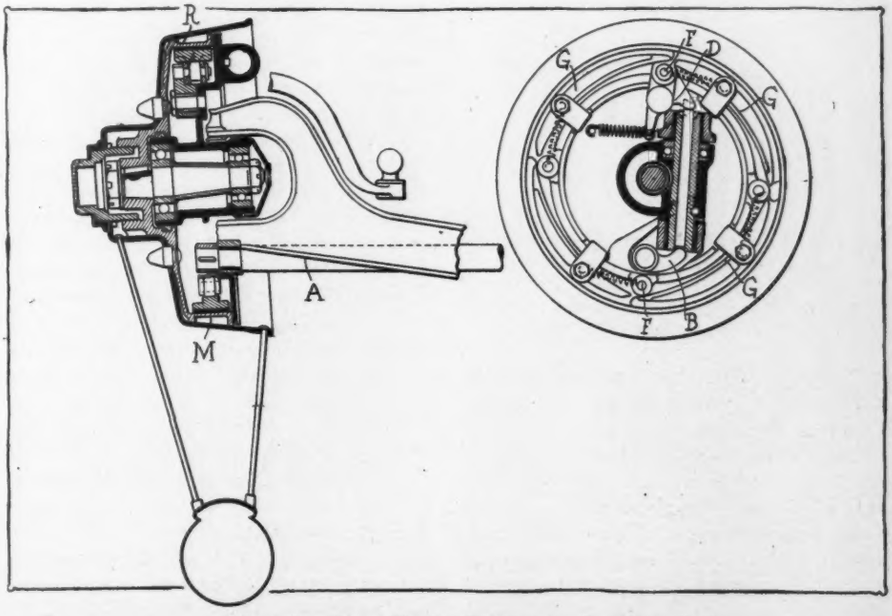

FIG. 18—FRONT-WHEEL BRAKES ON CROSSLEY CARS

UNIQUE ENGINEERING DETAILS AT OLYMPIA

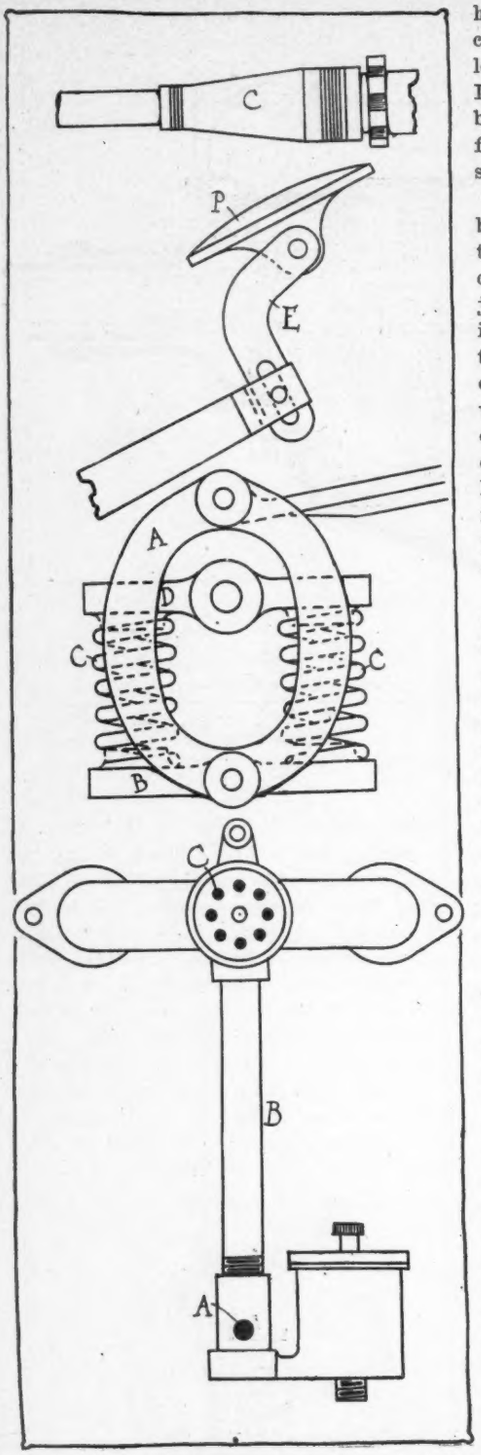

FIG. 1—DELAHAYE GREASE COVER
FIG. 2—SUNBEAM PIVOTED PEDAL
FIG. 3—STANARD SUPPLEMENTARY SPRING
FIG. 4—DARRACQ CARBURETER

LONDON, Nov. 11—There appears to be a very great diversity of opinion among motor engineers as to the fitting of torque and radius rods to live axles, and a walk around the Olympia show with the object of inspecting these alone provides much food for thought. Few makers, however, exhibit so neat an arrangement of dustproof covers to the jointed ends of these rods as are to be seen on the Delahaye chassis. Fig. 1 shows a sketch of the cover which consists, it will be seen, of a leather cone C neatly bound at each end. If these covers were well filled with grease before attachment they should prove perfectly dustproof and greasetight for a considerable time.

The makers of the Sunbeam car, who, by the way, usually pay considerable attention to the smaller details of chassis construction, now fit to their cars an adjustable pedal for clutch and brake operating. The sketch shown in Fig. 2 makes the construction clear. The forward part of the pedal has a loose curved end E which is provided with a slot in its lower extremity allowing a considerable amount of vertical motion. A bolt clamps the loose end to the pedal lever after adjustment and it will be seen that the pedal plate P is pivoted so that it may be adapted to the foot.

The use of coiled springs to supplement the laminated semi-elliptical side spring is displayed on more than one chassis and the arrangement adopted in the Standard car is noticeable. The twin shackles A, Fig. 3, take an elliptical form, the side spring being pivoted at the upper end; at the lower end is attached a bossed plate B which carries coiled springs C in duplicate, to the frame, secured on a substantial pin a similar plate D against which the coiled springs butt. The whole arrangement being fully exposed, has a somewhat intricate appearance, but should in practice prove very useful in insulating road shocks.

The Carburation Question

There is a tendency, at the present time displayed by some builders, to treat the carburation question somewhat differently from what has been the case in the past; the principal being a little akin to that employed in the gas engine in that the gas is supplied through one opening and air, to render it explosive, through another. In the type of carbureter embodying this principal air completely saturated with gasoline passes up a small-diameter vertical pipe, this mixture being, of course, far too rich for explosion. Air in quantity is, however, added later through a hand-controlled valve situated at the upper end of the pipe. A sketch of a typical one is given in Fig. 4, which represents the carbureter fitted to the Darracq cars. Air in sufficient quantities to form mixture enters through the small holes A and passes up the tube B. C represents the position of the hand-operated valve for supplying the necessary air to render the gas explosive. The arrangement allows a low position of float chamber—an advantage in cases where the gravity fuel supply method is used.

Trough Lubrication

The variable trough method of lubrication adopted by the Daimler company for use on the Silent Knight engine is employed in a different and rather simpler form on the Minerva sleeve-valve engine. In the Daimler engine the movement of the trough is a parallel one in the Minerva. The trough has a radial motion, it being pivoted at one end. A diagrammatical sketch of the arrangement is shown in Fig. 5. The trough A which is swung on the longitudinal shaft B has a mouth C communicating with its interior.

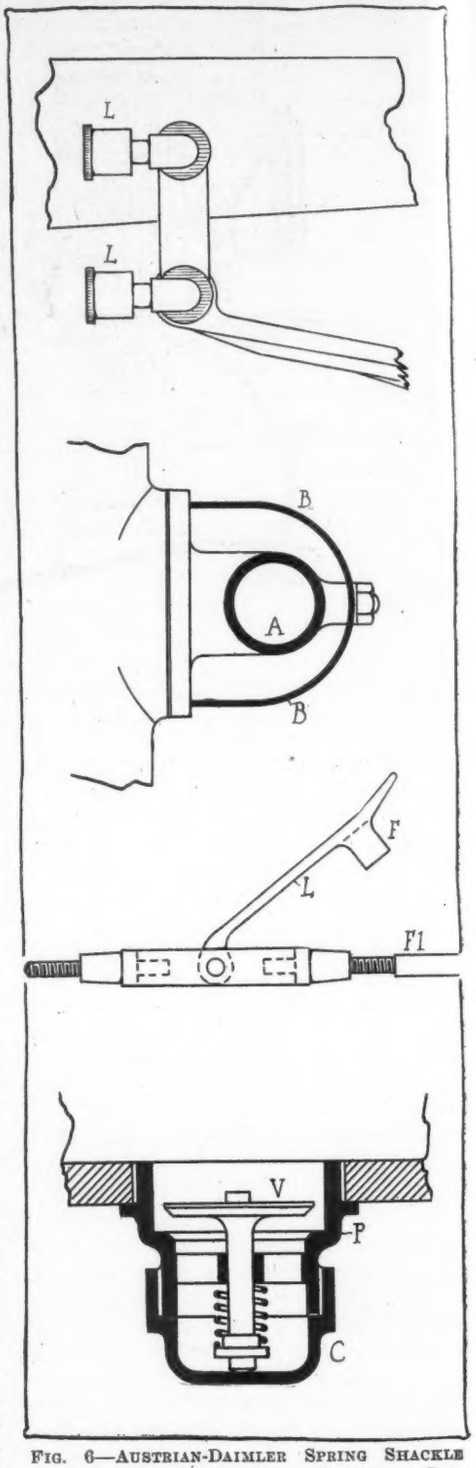

FIG. 6—AUSTRIAN-DAIMLER SPRING SHACKLE
FIG. 7—AUSTRIAN-DAIMLER EXHAUST PROTECTOR
FIG. 8—HOTCHKISS BRAKE ADJUSTMENT
FIG. 9—VAUXHALL OIL SCAVENGER

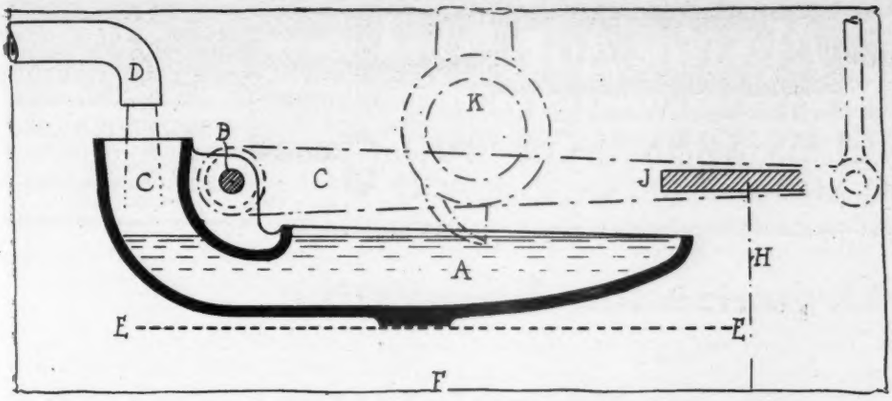

FIG. 5—OILING SCHEME ON MINERVA KNIGHT MOTOR

Oil delivered by a gear pump flows from the elbow D to maintain the trough full, any overflow dropping onto the strainer plate E and passing thence into the sump F for fresh use. By means of the lever C which is normally held down by the spring at H the trough A can be raised until its outer end comes to rest against the stop plate J, this latter position being of course that required for full throttle. The spring is relied upon to return the trough to its lowest position, the position in which it is represented in the sketch.

Much more attention is now paid by designers to spring shackle lubrication, it being well understood that if unlubricated great wear may take place in quite a short time. The rather neat arrangement in use on the Austrian Daimler, therefore, is worth noting. A glance at Fig. 6 will make it clear that the lubricators L are here fitted so as to project at 90 degrees to the usual one adopted.

It is unusual to find any arrangement provided for the prevention of personal contact with the hot exhaust pipe of the motor car engine when the bonnet is lifted, and therefore the guard fitted to the Austrian Daimler engine—which, it will be remembered, has sleeve valves—is worthy of remark. The exhaust manifold A in Fig. 7 is surrounded by a sheet metal casing B secured by two studs. A considerable air space is allowed between pipe and casing so that—as presumably the current of air propelled by the fan passes along this—the casing never can become objectionably hot.

Brake Adjustments

Of simple and handy brake adjustments there are not a few, some appearing to be more ingenious than reliable. That shown on the Hotchkiss chassis is a good one and is illustrated in Fig. 8. The usual right and left hand threads are provided and there is a special barrel nut with a slotted center portion. In the slot is pivoted a small lever L, having on its outer end a fork. In the figure the lever is shown lifted but when pressed towards the rod the fork end engages with a square portion F 1 of the rod and this forms a lock to prevent the turnbuckle turning.

In cases where accelerator pedal is used, and there are many, it is customary to furnish some adjustment so that on removal of the foot from the pedal the latter may return to a position corresponding to a minimum engine speed. There are a great number of ways of accomplishing this, some accessible, others not. On the 15 horsepower Germain is to be seen one of the most convenient. Here an arm A, Fig. 10, on the pedal shaft has a boss on its end screwed to receive an adjustment screws with a large-diameter milled head and a circular lock nut. The point of the former butts against a metal plate let into the floor board and the method of adjustment is obvious.

Acts as Oil Scavenger

In the majority of cases when a sump forms part of the engine lubrication system there is supplied simply a large drain plug for clearing foul oil and dirt accumulation. On the 30-horsepower Vauxhall, however, is to be seen what appears on examination to be a useful and ingenious device. This is sketched in Fig. 9. A cylindrical plug P is screwed into the base of the sump bottom, which plug forms a seating for a mushroom valve V. The lower end of the plug is screwed to receive a cap C. When this cap is in position its bottom end butts against the valve stem so that the latter is normally raised from its seat. In this position any dirt finding its way past the valve eventually will come to rest in the cap. Removal of this cap allows the valve to seal itself and thus close the outlet, while dirt accumulated in the cap can be removed and the latter cleaned in gasoline and replaced. A pressure on the stem of the valve when the cap is not in position will obviously allow draining.

In many cases where leather clutches are in use clutch stops are provided, of which that in use on the Singer cars is an example. This is shown in Fig. 11. The stop S, which is leather-faced, is held up to its work by a helical spring S 1 and its position is adjustable, as shown.

On the 15-horsepower Straker-Squire is seen one of the neatest and most mechanical brake compensating devices to be found at Olympia. The compensating arm A, Fig. 12, is of curved form, to the center of which is attached the knuckle joint in communication with the brake lever. To the lower end of the curved arm is pivoted a lever on the rocking brake shaft and the other end communicates direct with the brake drum lever.

While on the subject of the Straker-Squire chassis it will be well to remark on the side members of the frame which are of somewhat unusual section, Fig. 13. The lower part forms, what practically amounts to an underframe, and the whole undoubtedly gives a very stiff construction to the frame.

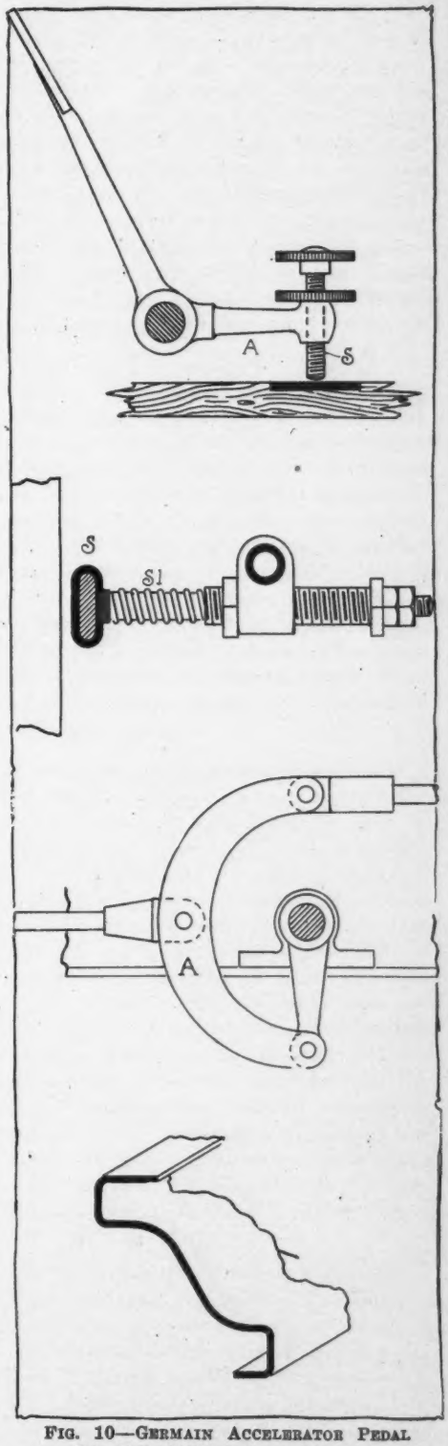

FIG. 10—GERMAIN ACCELERATOR PEDAL
FIG. 11—SINGER CLUTCH BRAKE
FIG. 12—STRAKER-SQUIRE BRAKE EQUALIZER
FIG. 13—STRAKER-SQUIRE FRAME

MOTOR AGE
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Factory Organization Imperative

THE old regime of "Build cars! we can sell them faster than you can build them—never mind the expense, just build cars" is over for at least the majority of concerns. Those halcyon days filled the manager with but one worry, namely, filling orders. In his own words, "Salesmen are not necessary to make sales, it is simply a question of show the car and write out the order." With such flood-tide demand it was meet that presidents of concerns, sales managers and factory superintendents should give little thought to factory organization, other than along lines of greater manufacturing capacity. These were the days of "build cars," no matter how costly the process of manufacture, how expensive the overhead factory cost, no matter how expensive the factory addition and no matter anything, but just "build cars." Capacity was the only watchword, it was the Alpha and Omega.

BUT things have changed. The inexhaustible demand has begun to wane in certain respects and prices have been cut. Whenever prices are cut the factory surplus is infringed upon, and for once at least the factory heads are impressed with the importance of stopping the leaks, with reducing if possible the cost of manufacture, with reducing if possible the cost of salesmanship, with reducing if possible the cost of raw materials and with reducing if possible the modus operandi of the complete factory. It is well that slumps, or panics, or earthquakes, or elections come along occasionally to disrupt temporarily at least the mad rush of "build cars" so that the finer details of the industry come into the picture and the true perspective of quantity, efficiency of manufacture, salesmanship and repairs is seen.

SINCE the inception of the motor car the engineer has been the big end of most factories. He has been the indispensable, the can't-get-along-without, the be-all and end-all of the factory. Naturally when "build cars" was the motto it was essential to have a design, to have the blue prints, the working drawings and the models—all this devolved upon the indispensable. But here things have changed. For next year many factories pride themselves on the few changes that have to be made. Perhaps the wheelbase has been lengthened or shortened a few inches; perhaps an extra leaf has been added to a front spring; the body seat made 2 inches wider; or the dash cleaned up. All of these are not very heavy for a year's efforts of the engineering department. But the department has not been idle. It has, as usual, served as inspector in every department, factory superintendent in many cases, overseer of the purchasing department. This is outside the pale of the real engineering department, and if the problems of car design are such as not to engross the complete attention of the engineering staff, then the problem of interior economy should.

INTERIOR economy is perhaps the best term to use when the question of reduction in manufacturing cost without reducing the wages of the workmen is to be considered. The person who engineers such a department can be styled an industrial engineer, or, if you desire, a production engineer. He must be an engineer to start with—not a graduated mechanic. The problems that he has to wrestle with are so numerous, so varied and so comprehensive that the best university training, coupled with the maximum of factory experience and wisdom of experience, is indispensable.

THE production engineer must know manufacturing systems; must know the construction of tools so that he can know their maximum capacity, and is in a position to judge as to whether the factory is getting out of the different machines all they can do. If they do not get the full capacity out of the machines the factory cannot but operate at a loss in such departments, and if such departments make money it is because the workmen are underpaid or the product is sold at too high a price. But the production engineer must know more than the capacity of the machine—he must know the capacity of the metal, if the term may be used. He must know the rate of speed at which it can be worked. If the metal is a high-speed steel, he should know if the tools are capable of cutting at 40 or 250 feet per minute. If he does not know this the factory is not operating scientifically, and with keen competition that factory cannot exist against the factory with its production engineers, and in which factory every department is operating at the highest point of efficiency.

BUT the production engineer must know more than his machines and his material—he must know his men. The study of man is more important and more interesting than either machines or metal. The production engineer should know whether the mental condition of the men is in the best condition. It may be the system of wages is diametrically wrong; that it is operating against the economy of the factory; it may be a case of weekly wages when piece work would bring in better results, both to the workman and the factory. The production engineer should be a student of psychology, being capable of following vaguely at least the brain workings of the men in order to get the best out of them, because when the factory is getting the best out of the men, the men are conserving their own interests best. It is the good will and co-operation of the workmen that must be obtained, which can be obtained by acting in obedience to the rational.

BUT the end of the production engineer is not yet. His works are still not even hinted at. He is the one who discovers the losses in the different departments, when on the surface everything seems to be going most favorably. He discovers the cost of night work, the lower capacity at which the machines work, the higher percentage of finished parts that have to be rejected, the greater rack and ruin on the machines; in a word, the too high price the factory pays for its night work.

HE discovers that where the temperature of a certain department is not correct, where the daylight is not long enough a visitor, where fresh air is not welcomed enough, where sanitary conditions are below par, and where department organization is at fault, that the immediate result is the impaired efficiency of the department. If all departments were such the entire factory would go bankrupt in a few months. He knows the producing cost everywhere; he knows the selling cost; he knows the loss due to poor arrangement of the factory departments; he knows the cost due to obsolete machinery; he knows the cost due to poor ventilation; he knows the cost due to poor lighting; he knows the cost due to dissatisfaction in the mind of the workmen; he is, in fact, this production engineer, the watchdog of the treasury, the real engineer of the factory.

SELDEN CASE IN THE COURT OF APPEALS

Full Bench Listening to Arguments Advanced by Lawyers of Ford and the A. L. A. M.

NEW YORK, Nov. 22—Special telegram.—With impressive pomp and circumstance the curtain has risen upon what may prove the final scene of the long drawn out Selden patent litigation. The stage is set in the federal circuit court of appeals, and a full bench, consisting of Judges McComb, Ward and Noyes are hearing argument pro and con with regard to the most momentous question ever raised in the history of motordom. A decision sustaining Judge Hough's ruling would mean a readjustment of motordom to meet the new conditions. An adverse decision would prove even more radical in its efforts, as it would lift the present litigation from the motor-making trade.

Henry Ford, president of the Ford company, is attending every session, as are attorneys representing many of the independent organizations and corporations. On the other hand, the A. L. A. M. is represented by a battery of legal talent and Alfred Reeves, and a number of other officers are watching each step in the proceedings with intense interest.

The proceedings were opened by Livingston Gifford on behalf of the appellant Ford company. His argument dealt chiefly with the argument of Edmund Wettmore. In Mr. Gifford's argument he traced the history of the motor car, beginning with steam vehicles in England, prior to the introduction of the railroad, and carried down to the time of Selden's application for patents. He referred to delays in the patent extending from 1889 to 1895 and then continued with the history of the development of the modern car. He particularly referred to the exhibition of a Benz car at the Paris exposition of 1893, and continued up to the present. He spoke in detail of the contributions to the art by Daimler, Ford, Duryea and Maxwell.

Taking another line, his argument went into the history of hydrocarbon gas engines, commencing with Lenoir in 1861, Brayton in 1872, Otto in 1876 and subsequent developments of them. His deductions from his array of facts were that Selden had contributed nothing to the art; that the Selden vehicle was wrong in every particular, including his wagon, his engine and his combination of wagon and engine. Finally Mr. Gifford concluded that the Selden patent was invalid in toto; that nobody had ever infringed it and that Selden himself never had built a vehicle or an engine that would run.

At the opening this morning Samuel R. Betts, for the appellees, opened the other side of the argument. Mr. Betts treated of the case generally, upholding the Selden device at every point where Mr. Gifford had assailed it. He asserted that the patent was valid and that courts had so adjudicated it. He was followed by William Redding, who took up the facts involved in the case. He pointed out that fact that there was no motor car used prior to the Selden patent and made an emphatic point that no patents are in file covering the subject matter that antedate those of George B. Selden.

Time for adjournment cut off Mr. Redding's address and it will be continued tomorrow morning. Following him will come Frederick P. Fish, a noted orator, who will complete the case of the A. L. A. M., treating upon the law of the action. Edmund Wettmore will conclude for the Ford company, except for an address by Frederick Coudert, who has been represented by the Panhard interests. It was found that the case could not be finished by Wednesday night and 2 hours will be allowed the attorneys on both sides to wind up the presentation on Friday.

Already the attorneys are figuring upon the future of the litigation in case the patents are overturned, the case may go to the supreme court of the United States of the same procedure that obtained in the Carnegie case; on the other hand, if the decision of the lower court is sustained, the attorneys for the appellants figure that a certificate of importance will be sufficient to take the case to the highest court. Both sides express the utmost confidence in the merits of their case, but neither principals nor attorneys would express any opinion as to the outcome.

Throughout the arguments the judges were attentively interested and numerous pertinent queries were directed at attorneys for both sides from the bench.

Judge Macomb particularly questioned Mr. Betts on several points made by the lawyers. This single fact seemed to enliven the opposing attorneys. On the other hand, Mr. Gifford had to answer numerous queries while he was addressing the court. A decision in the case is not expected immediately and may be delayed in regular order for several weeks.

November 24—Santa Monica road race, Los Angeles, Cal.

November 19-26—Show at Oakland, Cal., George E. Middleton, manager.

November 26-27—Motordrome meet, Los Angeles, Calif.

December 1-3—Show at Peoria, Ill.

December 1-8—First annual aeronautical exhibition, Chicago Coliseum.

December 3-18—Annual salon of Automobile Club of France.

December 25-26—Motordrome meet, Los Angeles, Calif.

December 31-January 7—American Motor Car Manufacturers' Exhibit Association show, Grand Central Palace, New York.

January 7-21—Eleventh national show at Madison Square garden, New York, under the auspices of the Association of Licensed Automobile Manufacturers, 7 East Forty-second street, New York; Merle L. Downs, secretary.

January 14-25—Annual Belgian show, Brussels.

January 14-28—Annual show of Philadelphia Automobile Dealers' Association.

January 15-21—Annual Detroit show.

January 28-February 4—Annual Chicago show of N. A. A. M., pleasure cars.

February 6-11—Annual Chicago show of N. A. A. M., commercial cars.

February 15-18—Show at Grand Rapids, Mich.

February 18-26—Annual Minneapolis show in National Guard Armory.

February 20-26—Show of Omaha Automobile Association at Omaha, Neb.

February 25-March 4—Show at Toronto, Ont.

March 4-11—Annual Boston show.

March 15-18—Show of Louisville Automobile Dealers' Association, Louisville, Ky.

Feb. 5-11—Annual show in Buffalo, promoted by Automobile Trade Association.

March 6-11—Second annual show of Des Moines Automobile Dealers' Association, Des Moines, Ia.

Feb. 13-20—Motor show in Convention Hall, Kansas City, Mo., under the auspices of the Motor Car Trades Association of Kansas City.

Feb. 18-25—Second annual show held by the Binghamton Chamber of Commerce and the Binghamton Automobile Club in the State Armory, Binghamton, N. Y.

THOMAS COMPANY AFFAIRS

Buffalo, N. Y., Nov. 22—Creditors of the E. R. Thomas Motor Co., who have been in session since yesterday, declare that they are convinced that the company shows that orders are coming in at a rate beyond the capacity of the plant to fill. A plan is being perfected to place the company on a satisfactory financial basis, but the details of the plan will not be announced until the latter part of the week. The meeting will continue through tomorrow, when a recess will be taken over the holiday. It is thought that the whole matter can be worked out by Friday night.

SANTA MONICA ENTRIES

Los Angeles, Cal., Nov. 21—Twenty-six entries have been received for the four Santa Monica road races which will be run Thanksgiving day, the entry list being as follows:

Light-car race, 231 cubic inches piston displacement and under, 101.004 miles—

Car	Piston displ.	Driver
Maxwell	229	E. H. Fancher
Staver-Chicago	201.8	James Fouch
Only Car	206	A. Van Valin
Oakland	201.1	George Bobst

231 to 300 cubic inches piston displacement, 101.004 miles—

Maxwell	241	Clarence Smith
Mercer	300	C. A. Bigelow
Petrel	285.6	Arthur Oakerman
Duro	280	J. McKeague
Buick	255	L. Nikrent
Mitchell	283.6	R. Greer

301-600 cubic inches piston displacement, 151.506 miles—

Apperson	475.2	
Apperson	597.2	H. Hanshue
Pope-Hartford	389.9	Bert Dingley
Lozier	544	T. Tetzleff
Knox	373	Earl Moss
Franklin	301.5	Bruno Seibel
Isotta	584	C. Soules

Free-for-all, 202.8 miles—

Fiat	655	Gabriel
Ohio	269.52	R. Henwood
Isotta	584	Soules
Apperson	475.2	
Apperson	597.2	Hanshue
Pope-Hartford	389.9	Dingley
Lozier	544	Tetzleff
Knox	559	J. Nikrent
Only Car	206	Van Valin

Car Taxation Highest in Europe

PARIS, Nov. 13—European governments, unlike that of the United States, have always looked upon the motor car as a happy source of revenue. Even France, which has been extolled as the friend of the motorist and put forth as an example of how the authorities should encourage the car industry, laid its iron hand on the first motorist who dared to run over the broad highway and declared "You shall render tribute." And when tribute has once been paid, it has always to be paid, generally at an increasing rate. In America the taxes on motor cars are so slight that the revenue hardly figures in the budget, in most of the European countries they form a most valuable asset to the government and have had such an influence that they have caused nearly all motor car manufacturers to build cars on tax-dodging lines.

Thirty States Without Taxes

Out of the thirty-eight states in the United States having motor laws, there are thirty in which no taxes are imposed on the car or on the owner-driver. Among these thirty are to be found a few which impose a slight tax on the professional driver. After expenses in connection with the collecting of the taxes have been wiped off, there cannot be more than a few hundred dollars income from the 580,000 cars estimated to be in use in the United States. Compare this with England, where with 50,000 cars and 40,000 motor cycles, the chancellor of the exchequeur estimates an income of $2,050,000, plus $1,875,000 from the recently created tax on gasoline, making a total of $3,925,000 paid in direct taxation. France, with 55,669 privately-owned cars, is estimated to have collected $2,134,980 in direct taxation for the year 1909, plus $61,116 for her 26,465 motor cycles. This makes an average car tax of about $38, and an average motor cycle tax of $2.40. But this is the amount of taxation paid before the cars are put into service, and as the car has not yet been invented which can run without fuel or without wearing down rubber, a certain amount must be added for taxation on these two commodities. In England the fuel tax is levied on the gasoline used in driving pleasure cars only, gasoline for all other purposes being exempt; in France all mineral oils: gasoline, kerosene, lubricating oils, are taxed, first by the state and afterward by many local authorities. It is estimated that the motor car is responsible for $7,000,000 of the amount received annually by the government for taxes on gasoline, kerosene and lubricating oil.

No Gasoline Tax in Belgium

Belgium is free from a gasoline tax, and its direct taxes are about 30 per cent lower than those of France and England. Germany is practically free from a gasoline tax, and her car taxes are considerably lower than those of England and France. Italy has an import duty on gasoline, and a moderate tax on private cars.

France and England, the two countries having taken the lead in motor car taxation, have fixed on horsepower as their basis. Brought down to its simplest elements, the French scheme consists of taking the manufacturer's estimate of the horsepower of a car, with the right, if they consider that estimate too low, of using a formula of their own. The formula, however, gives a rating about 50 per cent lower than the reality. This explains the general tendency of European manufacturers to give a low rating to their cars. It is wise when each horsepower may cost the owner from $1 to $3 per annum. It explains, too, why many of the biggest European cars will not print more than 25 horsepower—in the catalogue.

England has produced a system of taxation on the Royal Automobile Club rating of $\frac{D^2 \times N}{2.5}$ which has the defect, or rather the advantage in this case, of practically ignoring stroke. Whereas an old-fashioned square motor only produces the horsepower accorded it under the club rating, modern long-stroke high-speed motors delight their owners by making the taxation look ridiculous. To take an extreme case, one of the single-cylinder racers of 3.9 by 12 inches bore and stroke is taxed under the formula as 6.2 horsepower, whereas on the bench it will give 35 horsepower. A 6-year-old one-lunger of 4 by 3½ inches bore and stroke is given the same rating and pays the same amount in taxation. Another instance is to be found in a modern stock chassis of 2¾ by 6⅜ inches bore and stroke, which easily maintains 30 horsepower on the bench. Under the English formula it is given a rating of 12.1 horsepower and is placed in the class with cars of less than 16 horsepower. In France the authorities accept it as a 12-horsepower, and its owner pays for 12 horsepower only. There is an item here of interest to American manufacturers seeking a market in France and England. There being practically no horsepower taxation in the United States, it is a common practice to rate at 30 or 35 horsepower cars which in France only claim to have 12 horsepower. When the higher catalog rating adds $30 per annum more to the amount due the taxgatherer, the private owner will hesitate. Although they have their own formula, the French authorities are quite willing to accept any bloated estimate of power the manufacturer may care to put forth. In England, too, the short-stroke motor is handicapped—apart altogether from any technical considerations—by reason of its short stroke: a 3.1 by 3.1 motor pays exactly the same amount as a 3.1 by 6.2 bore and stroke motor, and it does not need much technical knowledge to know that the latter develops more power than the former.

It is interesting to note how the different taxation schemes affect the car owner in America, France and England. In New York it costs $2 to register a car and $2 for a professional chauffeur's driving license. So far as the owner is concerned, he pays $2 to the state on purchasing the car and is through all further payments so long as the car remains in his possession. In Chicago he has to pay the $2 annually, and has nothing whatever to contribute to the state as a private driver. The state which has most closely copied the bad European practice is Massachusetts, where the owner may have to pay as high as $25 per annum for his car, $2 for his examination fee and $2 for his driving license, a total of $29 for the highest powered car that can be put on the road.

How England Does It

Now compare this with England, and for the sake of accurate comparison take an ordinary four-cylinder touring car of less than 4 inches bore. This is admittedly a low-powered car, and one that might be placed in the $1,000 to $1,200 selling class in America. Before you can take it out on the road, the sum of $20 must be paid to the state. The registration of the car will cost you $4.80; you must have a driving license, for which a fee of $1 will be charged; if you keep a chauffeur you must pay for the privilege—apart from his wages—to the extent of $3.50. But the car is useless unless it travels, and as it cannot be made to give service without consuming taxed gasoline, there will be a further amount to pay to the treasury. The gasoline tax, of course, depends on the distance traveled, but estimating on 6,000 miles in the year and an average of 30 miles to the gallon, the treasury will be the richer through you to the extent of $12. Thus, for a little runabout, which you may have purchased second-hand for $500, you will contribute to the state the sum of $41.30 each year. If you are a wealthy man and have the temerity to own a six-cylinder car of a fraction over 5 inches bore, its direct taxation would be $285.60 per annum, with an addition of about $50 for the duty on gasoline consumed, driving licenses for yourself and chauffeur, etc., making a total of over $336 paid to the state. For the highest-powered private cars England holds the record in the matter of taxation.

Cost in France High

France is the dearest country in the world in which to own a small or medium-powered car, and it is not until we get into the 60 to 90-horsepower class that the taxation rates drop below those of Great Britain. Thus, for the four-cylinder of less than 4 inches bore, which in France would be rated at 12 horsepower, the car tax would be $12, plus $12 horsepower tax; a driving license costs $4, but once obtained is good for all time; prestation or special

roadmaking tax would amount to $6 or $7 for a car of this size, and 200 gallons of gasoline consumed in the year would entail the paying of $18 duty. This gives a minimum of $53 duty for a small car. In reality the amount secured by the state would be higher, for the government stamps on insurance policies, the stamped paper for driving and car licenses, and the local taxation existing in many districts on gasoline have not been included.

It has been supposed, too, that the car is owned in a moderate-sized town, for the rate of taxation increases in proportion to the number of inhabitants of the commune in which the car is kept. Further, the Paris municipality has the right to impose local taxes equal in amount to those paid to the state. Paris, too, has a local octroi which comprises a tax on gasoline, kerosene, alcohol, benzol and lubricating oil. Taking all these into account, and estimating on an annual mileage of 6,000 within the city limits—which, however, is hardly ever covered by a private car—the total amount of profit to state and city would be about $118. The owning of heavy gasoline-consuming cars in the city of Paris has become almost prohibitive.

Cheapest in United States

The United States is the cheapest country in the world in which to own a motor car. The examples already given show the advantages it possesses in the matter of freedom from taxation. The American can go into the market to purchase a car as unfettered as the buyer of a wheelbarrow. The European is bound round by questions of taxation and the cost of upkeep as represented by the tax on gasoline. It is certain that the American user is never brought to prefer a car of 3 inches bore in preference to one of 3½ inches cylinder diameter because the former will consume less gasoline. Supposing he uses 200 gallons of gasoline in the year, purchasing at 20 cents a gallon, the bill at the end of the year will only be $40, and for this amount he may, with a five-passenger car, have covered as much as 6,000 miles. In England the same amount of fuel will have cost him $56, of which the tax is responsible for $12. In France, supposing the gasoline is bought to the best possible advantage, that is without paying a local tax, the price will be $73. If the car is used exclusively in Paris the cost will be $118. There is only one country in Europe which can at all compare with the United States, and it is little industrial Belgium. There, thanks to the absence of taxation, gasoline can be purchased at 15 to 18 cents a gallon. On the whole, European motorists should secure a greater mileage per gallon than American drivers, entirely owing to the better road surfaces. The advantage, however, is nullified by the lesser life of tires, which are more rapidly eaten up on the hard smooth roads of Europe than on the softer macadam and dirt roads that are found in the United States.

Mercedes Wins a Patent Decision

LONDON, Nov. 8.—The case for the revocation of the Mercedes patents has at last been settled in favor of the patentees. The history of the case is as follows: The Fiat company sought the revocation of certain of the Mercedes patents under the terms of section 27 of the patents and designs act, 1907, namely that the patented article in each case was manufactured mainly or exclusively abroad. The patents involved were the gate-change speed control, honeycomb radiator, honeycomb radiator in conjunction with flywheel fan, brake-cooling device, dished axle and differential.

The contention of the applicants was that a great number of cars were imported into this country fitted with one or the other of the said devices which were asserted to be the patented article. It was admitted that a large number of manufacturers were using a similar device or devices in this country, practically in infringement of the said patents. The case was really fought under sub-section 1 of section 27, to decide whether, in comparing the manufacture at home and abroad for the purpose of deciding whether "the patented article or process is manufactured or carried on exclusively or mainly outside the United Kingdom," the amount of manufacture by infringement in this country can be taken into consideration, or whether, on the contrary, the only manufacture upon which the patentee can rely is manufactured by him or his licensees under the patent.

The comptroller held by the ordinary rules of law that if the term "patented article" meant in respect of foreign manufacture an article made in accordance with the description and claims of the specification, it must equally have the same meaning at home, whatever might be the result of such construction, and that it would hardly be fair to allow manufacture by anyone anywhere to be brought against the patentee, while he is not allowed to defend himself except by relying on his own manufacture or the manufacture or his agents or licensees in this country. The comptroller held that the patentees were entitled to judgment; an appeal was lodged, and yesterday Justice Parker upheld the decision of the comptroller. Justice Parker ruled that in his opinion, for the purpose of sub-section 1, it was quite immaterial whether the article or process manufactured or carried on in this country is or is not so manufactured or carried on in derogation of the rights of the patentee under his patent.

This appeal for revocation has been hanging up any action on the part of the patentees for infringement for some 18 months, and it is anticipated that immediate action will now be taken by the owners of the Mercedes patents in connection with radiator and gate-change speed gear.

In Italy and Switzerland action has been taken in connection with the honeycomb radiator, and the Fiat company and the firm of Megevet have both been proceeded against and the patent upheld. It is rumored that the amount paid already for royalties by these firms amounts to $136,080.

MEANS MUCH FOR ROADS

Washington, D. C., Nov. 22—There will be a meeting in Washington this week which is likely to prove to be the most important gathering ever held in this country in the interest of the improvement of roads. The purpose of the meeting is to harmonize the efforts for good roads in all parts of the United States. It is the purpose to organize a national association which will co-operate with the associations of farmers, such as the National Grange and the Farmers' Union, in promoting the good roads movement. Permanent official headquarters are to be established in Washington. Secretary Wilson has given the movement his sanction. It is the intention to make this new organization a sort of clearing house for co-operation.

The following comparative table shows the amount that would have to be paid in taxation for 1 year on a five-passenger car with four-cylinder motor of less than 4 inches bore, in London, Paris, the French provinces, Belgium, New York state and the state of Massachusetts. New York state is selected in order to make a comparison between New York city and the European capitals—London and Paris. Massachusetts has been fixed upon because it is the state in which the highest rate of taxation is in force. It is assumed that the gasoline consumption of the car is 200 gallons for the year. The sums spent on driving licenses are included, although in some cases a driving license once secured is good for all time.

TABLE SHOWING COMPARATIVE TAXATION ON MOTOR CAR

	London	Paris	French provinces	Belgium	New York state	State of Mass.
Car tax	$20.00	$ 35.08	$11.28	$ 4.80	None	None
Horsepower tax	*	22.80	11.28	25.00	None	None
Car registration	4.80	.12	.12	None	$2.00	$ 5.00
Owner's driving license	1.00	4.00	4.00	None	None	4.00
Chauffeur's license	3.50	4.00	4.00	None	2.00	4.00
Road-making tax	None	None	6.24	None	None	None
Gasoline tax	12.00	54.48	17.28	None	None	None
Total	$41.30	$120.48	$54.20	$29.80	$4.00	$13.00

* Included above

Gossip of the Trade From Detroit

DETROIT, MICH., Nov. 21—The long-expected crisis in the affairs of the Barnes Motor Co., formerly the Anhut Motor Car Co., came Thursday last, when Frank Howard, of this city, on behalf of a number of creditors, filed a petition in the United States district court here asking that the concern be declared bankrupt. Following the formal order of adjudication, William M. Walker, president of the company, was appointed receiver, with a bond of $15,000.

The schedules place the total liabilities at $64,242.33 and the assets at $143,540.25. Many of the latter are said to be of a doubtful character, however, and the creditors will not realize anywhere near the full amount of their claims, it is declared. The bankruptcy proceedings were forecast by Mr. Walker more than a week ago, when about $14,000 was distributed among the creditors through the Union Trust Co. At that time Mr. Walker said:

"We have made a settlement on a basis of 20 per cent with the creditors. A few refused to accept this basis of payment, and for the purpose of clearing up the indebtedness and satisfying these few it probably will become necessary for the concern to go into bankruptcy."

Barnes Company Creditors

Among the principal creditors are the Peninsular Savings Bank, Detroit, $4,000; American Ball Bearing Co., Cleveland, $3,697.40; Anhut-Robinson Auto Sales Co., Detroit, $1,960; R. C. Day, Toledo, $1,648; R. C. Durant, son of W. C. Durant, of the General Motors, $2,812; F-E-Z Auto Sales Co., Chicago, $2,500; Griswold Motor and Body Co., $6,245; N. B. O'Connor, $3,000.

Assets include parts, machinery and partly completed motor cars in the plant at 510 Howard street, on which a valuation of $21,500 is placed; a factory and real estate in Chatham, Ont., valued at $50,000; $2,116 due the company in notes, and $26,571.23 in open accounts, but included in the latter item is about $20,000 in fire insurance policies.

The plant in Chatham never has been operated and there is some question also as to the company's title, to determine which litigation is necessary. The Detroit plant was simply leased.

Assets of the Thrall Motor Co. were sold at a receiver's sale for $5,300, subject to confirmation by the court. The purchaser was Edmund J. Stafford.

The General Motors has figured prominently in the financial doings here the past week, owing to the taking over of the control by the New York and Boston bonding syndicate, headed by J. and W. Seligman & Co. and Lee, Higginson & Co. Albert Strauss and James J. Starrow, of the new directorate, arrived the latter part of the week and will remain in Michigan for several days, familiarizing themselves with the conditions existing at the various subsidiary plants of the General Motors. Mr. Strauss said that there would be no formal meeting of the board in Detroit, for the present at least.

The $20,000,000 mortgage of the General Motors Co., running to the Central Trust Co., of New York, was filed with the registrar of deeds here last week. At the same time deeds were filed transferring the realty of the Cadillac Motor Car Co., the Welch company and the Northway Motor and Mfg. Co. to the General Motors Co. for respective considerations of $1,840,000, $300,000 and $529,000, a total of $2,669,000. The mortgage is the largest ever recorded in Wayne county. The First National Bank, of Detroit, has the initial deposit of $2,500,000 forwarded by the eastern capitalists. Others are to follow shortly, and out of these funds claims are to be paid as fast as they can be audited.

It is reported here on good authority that the semi-annual dividend on General Motors preferred will be paid November 30. As a result there is a rather brisk inquiry for this stock.

An announcement of more than usual interest to local motor car manufacturers was made by Congressman Butler Ames, of Boston, who is prominently identified with the Heinze Electric Co., at a board of commerce luncheon in the Hotel Cadillac last week, when Ames said that his company had practically decided to remove to Detroit. "We learned in the east that you have a gasoline aristocracy out here that is worth getting into," he added.

Mr. Ames has been in consultation during his stay in Detroit with Truman H. Newberry, former secretary of the navy, and other of the city's prominent capitalists. It is understood that negotiations already are under way for a site for the new plant.

Big Plant at Monroe

Work has been started at Monroe, Mich., on an extensive plant for the Seitz Crucible Foundry Co., which is controlled by the Seitz Automobile and Transmission Co., of Detroit. In this plant will be made all the steel bars, iron and aluminum castings for the Seitz motor trucks. The Seitz people also are erecting a mammoth factory in Wyandotte, a suburb of Detroit.

The Monroe plant will comprise two main buildings, each 50 by 140 feet; one wing, 26 by 140 feet, with an office building in front, 61 by 126 feet, and a power plant, 42 by 48 feet. The buildings are of steel frame construction, with brick walls and slate roof, the front being of pressed brick, with stone trimmings.

A new engine is to be manufactured here shortly by the Automobile Manufacturing and Engineering Co. A plant is being erected on Harper avenue and the company has established temporary offices at 86 Edmund place. R. H. Evans, of the Evans Motor Car and Parts Mfg. Co., of Marine City, is secretary of the new concern and one of those most actively connected with the enterprise. The engine is of 32 horsepower. It is claimed that it has 103 fewer parts than any other motor of the same class. It weighs only half as much and takes up only half as much space as the average four-cylinder motor and will throttle down to twenty-five or thirty revolutions per minute, it is said. No fan is required. Mr. Evans says that one of these engines has been in service for 18 months and that, in that time, it has not cost 50 cents for repairs, although the distance covered was about 14,000 miles.

Pontiac Motor Center

Pontiac, Mich., just north of this city, is rapidly coming to the front as a commercial center, thanks to the motor car. This fact was emphasized at the first annual banquet of the Pontiac Commercial Association, at which the motor car interests were very largely represented Friday night. The post-prandial speeches developed the fact that five new industrial plants are now going up there, including the motor cycle works, in which Robert M. Brownson and other Detroiters are interested. The banquet took an unexpected turn when Walter E. Flanders, of the E-M-F Co., who is prominently identified with the new industries, observed that Pontiac was sadly in need of a modern hotel and calmly asked for subscriptions. In about 5 minutes $75,000 had been pledged for this purpose and Mr. Flanders contributed $10,000 of it.

The Cass Motor Truck Co., of Port Huron, plans to turn out one car per day from now on, the output to be increased as soon as the demand warrants.

MATHESON RECEIVER DISCHARGED

Philadelphia, Pa., Nov. 21—Judge Fuller, of the court of common pleas of Luzerne county, Pennsylvania, sitting in equity, handed down on Thursday last a final degree to the receivers of the Matheson Motor Car Co., confirming his order of October 31 to the receivers, Asher Miner and W. C. Shepherd, to transfer to the Matheson Automobile Co. all of the property, rights and franchises of the Matheson Motor Car Co. This action completes the last legal step necessary on the part of the court to discharge the receivers from further service, and from now on the Matheson Automobile Co. will continue under its new management. At the first stockholders' meeting of the reorganized company the following directors were elected. W. C. Shepherd, president and general manager; J. W. Hollenback, vice-president; E. F. Matheson, secretary; Henry H. Pease, treasurer. The following directors were elected: W. C. Shepherd, J. W. Hollenback, Asher Miner, W. H. Conyngham, John A. Turner, W. H. Son, John C. Bridgman, R. Nelson Bennett, I. M. Thomas and C. W. Matheson, of Wilkes-Barre; M. W. O'Boyle, of Pitts-

ton; Henry Hess, of Philadelphia; E. S. Fretz, of Pottstown; J. B. Russell, of New York, and Cortez Jennings, of Towanda. The paid-in cash capital of the Matheson Motor Car Co. was $350,000 and the bond issue $200,000. The paid-in- cash capital of the Matheson Automobile Co., which was the New York selling company, was $150,000. Seven hundred thousand dollars new money has been added to the reorganized company in the form of $595,000 first preferred stock issued and $105,000 bonds issued. The new money added gives the reorganized company a paid-in cash capital of $1,100,000, plus the bond issue of $300,000. The authorized stock and bond issues of the company are $1,000,000. The working force of the plant will be gradually increased. It is anticipated that the New York salesrooms, garage and repair department of the company on Broadway above Sixty-second street will be continued as a retail branch of the business to supply the metropolitan district. The wholesale sales department has been transferred from New York to Wilkes-Barre. The company will confine its output to its big four and silent six cars. The prospects are claimed to be bright.

TIRE PRICES DROP

Akron, O., Nov. 19—A reduction of 10 per cent in the price of the regular make of side-wire tires was announced this week by the Firestone Tire and Rubber Co., effective at once. The company, in sending out a statement explaining its action, said that the drop in the crude rubber market, which is bringing about a general readjustment of tire prices, is due to the refusai of American rubber manufacturers to buy at the recent inflated prices demanded by London speculators. The Firestone company states that a general cut in solid tire prices is expected. President F. A. Seiberling, of the Goodyear Tire and Rubber Co., states that his concern has already reduced the price of solid tires and that the pneumatics will be cut from 15 to 20 per cent before January 1. Other companies expect to make similar reductions in the near future.

Chicagoans Test Benzine As a Fuel

CHICAGO, Nov. 21—In order to determine the validity of a claim made by the makers of the Rayfield carbureter that their carbureter was adaptable to the use of naphtha, commercially known as benzine, as a fuel without the necessity of readjustment, a test has just been completed under the auspices of the Chicago Motor Club, in which the claims were found warrantable.

The test was made on the same Falcar, driven by Charles F. Van Sicklen, that tied with the Molines for the roadster trophy in the recent 1,000-mile reliability run of the Chicago Motor Club, and representatives of the motor club's technical committee and the Rayfield carbureter accompanied Van Sicklen.

The test consisted of a 670-mile run to Cincinnati and back, on which an average running schedule of 22 miles an hour was maintained, and 36 gallons of fuel was consumed, which averages 18.6 miles to the gallon. The only trouble experienced in starting the motor was on the morning of the last day of the run, after the car stood over night in a cold garage, and gasoline was used to prime the cylinders.

Benzine is the commercial name for naphtha, which is a mixture of the lighter and more volatile hydrocarbons that pass off in the earlier stages of the distillation of crude petroleum. It is essentially different from benzene, the latter being a definite chemical substance, belonging in the group of aromatic compounds; while benzine is a more or less indefinite mixture of hydrocarbons that chiefly belong to the paraffin series. Benzine or naphtha differs but little from gasoline, such differences as exist being due to variations in the proportions in which the constituent hydrocarbons are present. A better mileage per gallon and more power can be obtained with naphtha and it costs less, but gasoline vaporizes more readily and makes starting of the motor easier.

After the completion of the 1,000-mile reliability run, the Falcar was kept under the vigilance of Pinkerton men until the following Thursday morning, when the test was started. On the evening before the test the fuel tank was drained of its gasoline by F. E. Edwards, chairman of the motor club technical committee, and refilled with naphtha, testing 55 specific gravity at 40 degrees Fahrenheit, which is equivalent to 57 at 60 degrees or normal; and a gallon of unadulterated lubricating oil was put into the oil reservoir of the motor crankcase.

The start was made from the Van Dyke garage at 8:45 a. m. The motor was stopped for a time between 1:15 and 1:45 p. m., while lunch was being taken, and at 6:40 p. m. the car entered a garage in Indianapolis, where the car was placed in the custody of a private policeman. A supply of 10 gallons of fuel, the same as was being used and which had been carried in the tonneau of the car, was placed in the fuel tank before leaving the car for the night, and as this came within about ½ gallon of filling it, it was estimated that the 204 miles had been made on about 10½ gallons of fuel or a trifle over 19 miles to the gallon.

The next morning the car left Indianapolis at 8:30 a. m., stopped for 8 minutes after 1 p. m. to replace a punctured tire and arrived at Cincinnati at 2:05. Here fuel and oil were again taken on. Seven gallons of naphtha testing 53 degrees Beaume at 41 degrees Fahrenheit filled the tank, an average of about 20 miles to the gallon, and 10 gallons were put into the 5-gallon cans carried in the tonneau.

The return trip was started the next morning at 8 o'clock, a stop of 2 hours and 20 minutes was made at Indianapolis for lunch, where an extra passenger and luggage were taken on, and the night stop was made at Lafayette at 6:10. This was a hard day on the fuel consumption feature, as the route back from Cincinnati was excessively rough and hilly. Here the reserve supply of 10 gallons of fuel came within about ½ inch of filling the tank. Two quarts of oil was put into the motor, and the car was again turned over to a watchman. At 9 a. m. the next morning the last leg of the run was started, and the car arrived in Chicago at 4 p. m. after having made stops which consumed about 1½ hours. The car weighed 3,600 pounds with three passengers.

FALCAR DRIVEN BY VAN SICKLEN IN BENZINE TEST

CANADIAN RELIABILITY PROPOSED

Winnipeg, Manitoba, Nov. 21—A Winnipeg paper, Modern Power, is organizing a reliability tour for western Canada which will be held about August 1 over a route 2,300 miles in length running from Manitoba to Saskatchewan and Alberta. The affair will be run under the rules of the American Automobile Association and the referee will be appointed by Chairman Butler. The entry fee probably will be $150 a car.

FACTS AND FIGURES ABOUT ENGLISH TRADE

LONDON, Nov. 9—The motor trade in Great Britain has successfully passed through the depression which developed during the year 1908 and 1909, and at the present time the trade is in a distinctly flourishing and healthy condition.

In spite of duty-free imports the manufacturers are all the time increasing and selling their productions. The closing of the French show in 1909 has undoubtedly been the means of attracting more attention to British cars and the French manufacturers must now see the mistake of their action in not holding the show in 1909.

The output of British manufacturers appears very insignificant when compared with the enormous number of cars produced in the United States, and even with the addition of imports the figures still are only a small percentage of the United States output.

The actual production of cars in Great Britain is not so easily estimated as in the United States, for the reason that except in a few instances the manufacturer here does not declare his output, and it is really quite exceptional for any except the larger manufacturers to declare their output. However, by turning to the figures of registration one can obtain a very near computation of the position. For instance, the total increase in registration for the year 1909 was as follows:

Private cars	13,435
Trade vehicles	3,077
Public service cars	2,672
Total increase	19,184

The total registration was:

Private cars	84,840
Trade vehicles	15,181
Public service cars	8 752
Total registration	18,773

In order to arrive at the number of cars actually built in Great Britain the importations must be deducted from the gross increase and the exports added. The imports of 1909 were as follows:

	No.	Value
Cars	3,666	$ 5,944,037.58
Chassis	4,855	6,422,596.56
Totals	8,521	$12,366,994.14

In addition parts to the value of $8,611,725.60 were imported, making the actual total value of imports $20,978,719.74. Of the foreign cars and chassis imported 774 were re-exported, composed of 550 cars valued at $860,531.04 and 224 chassis valued at $380,397.06, also parts to the value of $673,075.98. Deducting the above re-exports the net imports of cars and chassis is reduced to 7,747 in number. The exports of British-built cars and chassis were:

	No.	Value
Cars	2,583	$4,635,691.56
Chassis	219	409,080.78
Totals	2,802	$5,044,772.34

The parts exported were valued at $2,555,329.68, making total British manufactured exports under the three headings $7,600,102.02. From these figures we find that the total cars built by British manufacturers would be approximately as follows:

Increase in registration	19,184
Deduct net imports	7,747
Total	11,437
Add British exports	2,802
Total cars and chassis British manufacture	14,239

The average value of the imports was as follows:

	Each
Cars	$1,618.38
Chassis	1,321.92

And the average value of the British-built exports:

	Each
Cars	$1,794.34
Chassis	1,866.24

The returns for 1910 up to end of September last denote that the records of 1909 will be exceeded. These returns are:

	No.	Value
Imports of cars and chassis	8,352	$11,396,277.18
Parts	.....	7,313,303.70
Total imports for 9 months	.....	$18,709,580.88

The figures of British exports are:

	No.	Value
Cars	2,271	$4,249,204.92
Chassis	402	730,117.80
Parts	.....	3,552,062.22
Total British exports for 9 months	.....	$8,531,384.94

The corresponding figure for British exports for the 12 months ending December, 1909, was $8,086,102.02, which it will be seen is already exceeded by the returns for the 9 months to September 30 last. The average value of the imports and exports for 1910 is:

	Each
Imported cars	$1,555.20
Imported chassis	1,244.16
British exported cars	1,871.10
British exported chassis	1,822.50

The average values of the imports and exports tend to show that the price of British cars is on the average higher than those of foreign construction, and that either the British manufacturer does not cater for the cheaper lines, or that he does not produce his goods at such a low cost as his foreign competitors. It may be interesting to give a few figures relating to imports, re-exports from and to France and the United States, and the totals of imports and exports from 1906.

	Imports	Re-exports
FRANCE		
1906	$14,685,408.00	$610,712.46
1907	14,987,642.22	474,127.02
1908	13,131,520.74	464,752,08
1909	12,250,198.62	502,606.62
UNITED STATES		
1906	1,017.202.86	537.700.68
1907	990,997.74	344,049.12
1908	557,072.64	111,313.44
1909	710,629.20	68,049.72

Exports of British cars and parts to United States:

1906	$219,244.32	1908	$207,813.60
1907	222,170.04	1909	336,414.06

Total imports of motor cars and parts into United Kingdom 1906 to September 30, 1910:

1906	$21,246,219.00
1907	22,126,539.96
1908	19,986,560.46
1909	20,978,719.74
1910 to September 30	18,709,580.88

Total exports of British-built cars and parts:

1906	$3,979,438.84
1907	6,439,295.88
1908	6,116,596.74
1909	8,086,102.02
1910 to September 30	8,531,384.94

Total re-exports of motor cars and parts:

1906	$2,052,348.84
1907	2,345,751.90
1908	1,746,300.06
1909	1,914,004.08
1910 to September 30	1,692,679.68

From these figures it is seen that there is a large and regular yearly increase in the volume of business covered by the exportation of British-built cars, and at the same time a diminution in the volume of business covered by the re-exportation of foreign-built cars; also that the imports of foreign cars do not reveal any increase commensurate with the increased business in the home trade. This leads us to the assumption that the British manufacturers are getting the benefit of the increased trade, not only in the home market, but also in the colonial trade.

While these figures are satisfactory to the British manufacturer, it is still to be noted that 40 per cent of the cars purchased in Great Britain is of foreign manufacture. The importation of American cars is insignificant when compared with the imports from France, which far exceed the imports from any other country. As a matter of fact the imports from Germany, Belgium and Italy each exceed the imports from the United States. The comparative import figures for 1909 are:

France	$12,250,198.62
Germany	2,411,905.70
Belgium	1,876,776.48
Italy	1,095,755.04
United States	610,529.20

The United States in 1909 only supplied 3.3 per cent of the total imports. The figures given of registrations, imports and exports do not apply exclusively to pleasure cars, but also include commercial and public service vehicles. There are in Great Britain some sixty manufacturers of motor vehicles, of which forty-five are manufacturers of pleasure vehicles. Taking 14,200 as being the total output of British manufacturers we get an average of only some 236 vehicles per manufacturer. The output of the ten leading firms will account for at least 50 per cent of the vehicles constructed, which leaves a large number of firms with a very small output, with the consequence that prices must in many instances rule high. The following list gives the retail prices of the leading four-cylinder cars under 20 horsepower R. A. C. rating:

	H.P.	
Belsize	19.6	$1,336.56
Alldays	18.3	1,584.36
Argyll	15.9	1,506.60

Armstrong	15.9	1,871.10
Austin	19.6	1,871.10
Calthorpe	13.9	1,171.26
Crossley	15.9	1,871.10
Daimler	15.9	2,308.50
Deasy	19.2	1,992.60
Napier	16.7	2,089.80
Rover	17.9	1,871.10
Straker	18.8	1,749.60
Star	12.9	1,215.00
Star	16.7	1,385.10
Swift	17.9	1,822.50
Clement Talbot	15.8	1,871.10
Wolseley	15.6	*1,482.30
Vauxhall	17.9	*1,671.84
Arroll Johnson	15.9	1,822.50
Vulcan	15.9	1,360.80

* Chassis only

From the list it will be seen that the 15.9 Daimler is the most expensive in the list. Here we have a firm with a big reputation and a big output maintaining a high selling price and realizing large interest on its capital. On the other hand the 19.6 Belsize is listed at $1,385.10. In this instance the makers have a fairly large output and specialize on practically this one model only, with the result that at a very moderate price the return on the capital invested, though small in comparison, is satisfactory.

That all British makers have not yet fully realized the full benefits to be obtained by standardization is clear from the many models which in some instances small firms attempt to manufacture; moreover, there is practically no combination amongst the manufacturers to come to any agreement on the standardization of certain component parts, which, without interfering with any individuality of design, might assist in a reduction of cost.

It is the writer's opinion that in an up-to-date and well-organized British factory, and with a sufficiency of working capital, and advantageously placed as regards labor—an advantage possessed by very few of the existing firms—cars can be produced at a price below that of any other European country. That there would be an outlet for the products is made manifest by the increasing export trade and the large importation of foreign cars.

The year 1908 was a disastrous one for the British motor trade. Two of the largest firms, viz., Argyll and Humber, Ltd., went into liquidation in that year, although the latter had in the year 1906 made a profit of $517,871.88, and in 1907 a profit of $603,675.18. The difficulty both these companies met really was a shortage of working capital. Both had just expended enormous sums in new factories, and had not the necessary resources to carry over the depression which prevailed at that period. Both these firms have, however, been re-constructed and would appear to be rapidly regaining their positions.

The Daimler company, with which the writer was connected, has made large profits. In 1906 with a turnover of fewer than 1,000 cars the profit was $999,034.92, and in 1907 $603,675.18. These profits were not realized in 1908 and 1909; in fact, a loss was shown in 1908. Since, however, the Knight motor has established itself, the present year has been one of great prosperity. To such an extent has this motor caught on that the Daimler company now has the largest motor factory in Great Britain, employing not fewer than 4,500 workmen, and has exported cars this year to very nearly $1,215,000 in value, a large proportion of which have been delivered into France in spite of the 15 per cent duty. The satisfactory position of the Daimler company is in part due to the new models which were introduced with the Knight motor, and also to the general revival of the industry.

The general healthy state of the trade is apparent all along the line, and all the well-established firms will declare dividends to their stockholders.

The results of the trading of one of the smaller motor companies just published is typical of the general prosperity. A profit of $100,602 is shown on an invested capital of less than $388,800.

British subjects throughout the world are asking all the time for British goods, and the imported cars are not so easily sold as heretofore. The continental cars of well known repute do, and doubtless will continue to find customers, but new comers will have to establish their reputation. The standard of reliability and endurance set by the British buyer is perhaps higher than in any other country; the records made by British cars in trials conducted by the Royal Automobile Club never have been excelled by any imported cars. Newcomers catering for the British trade have therefore to be alive to the fact that price is not quite the ruling factor which influences the sale of any car; a certain standard of efficiency must in every case be fully established.

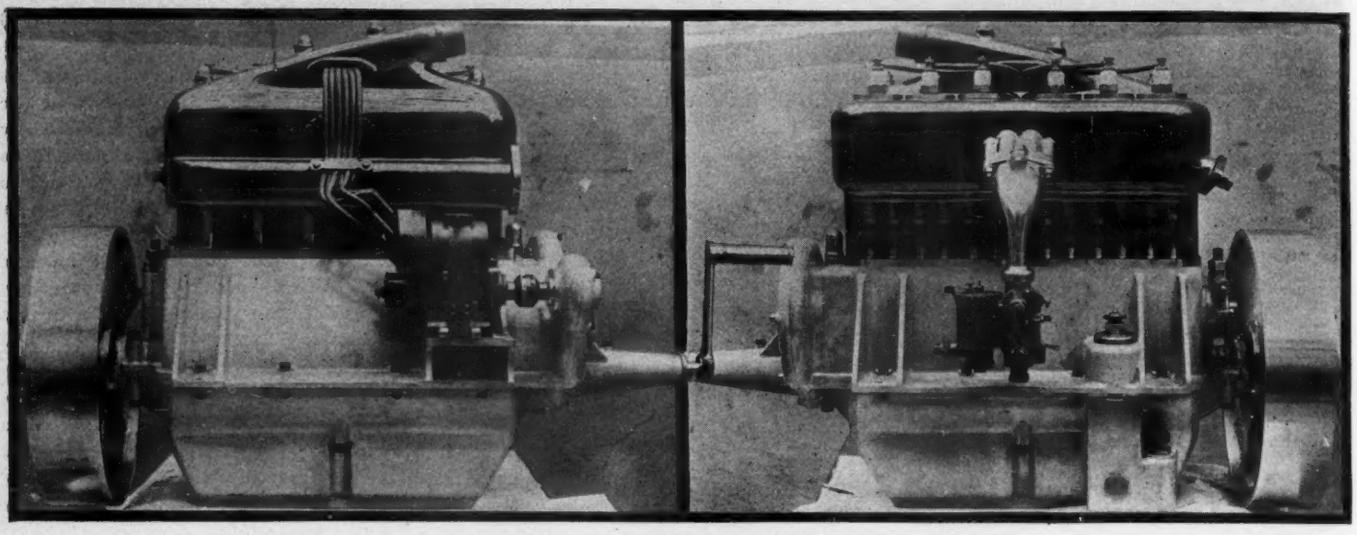
COUNT OF FRENCH CARS SHOW TOTAL OF 53,699

PARIS, Nov. 9—France possesses 53,669 privately-owned motor cars in actual service. The figure is an increase of 8,900 on the number of cars on the road 1 year ago. Although these statistics are official, they do not represent the total number of motor cars actually existing in France, for they are supplied by the treasury department and represent the cars eligible for full taxation during the year 1910. Manufacturers,' dealers' and agents' stocks, even if on the road for demonstration purposes, do not pay taxes and are not included in the official returns. Motor cycles, taxicabs, motor buses, and all purely commercial vehicles pay indirect taxation and also are excluded. Cars that are not fit to go on the road, or which for any reason whatever are to be laid up for a year, naturally are not spoken of to the tax-gatherer and therefore fail to appear on the returns. There are no double registrations in these figures, for when a man sells a car he at once informs the authorities, in order to avoid being made to pay for something he has not got when the assessors come around.

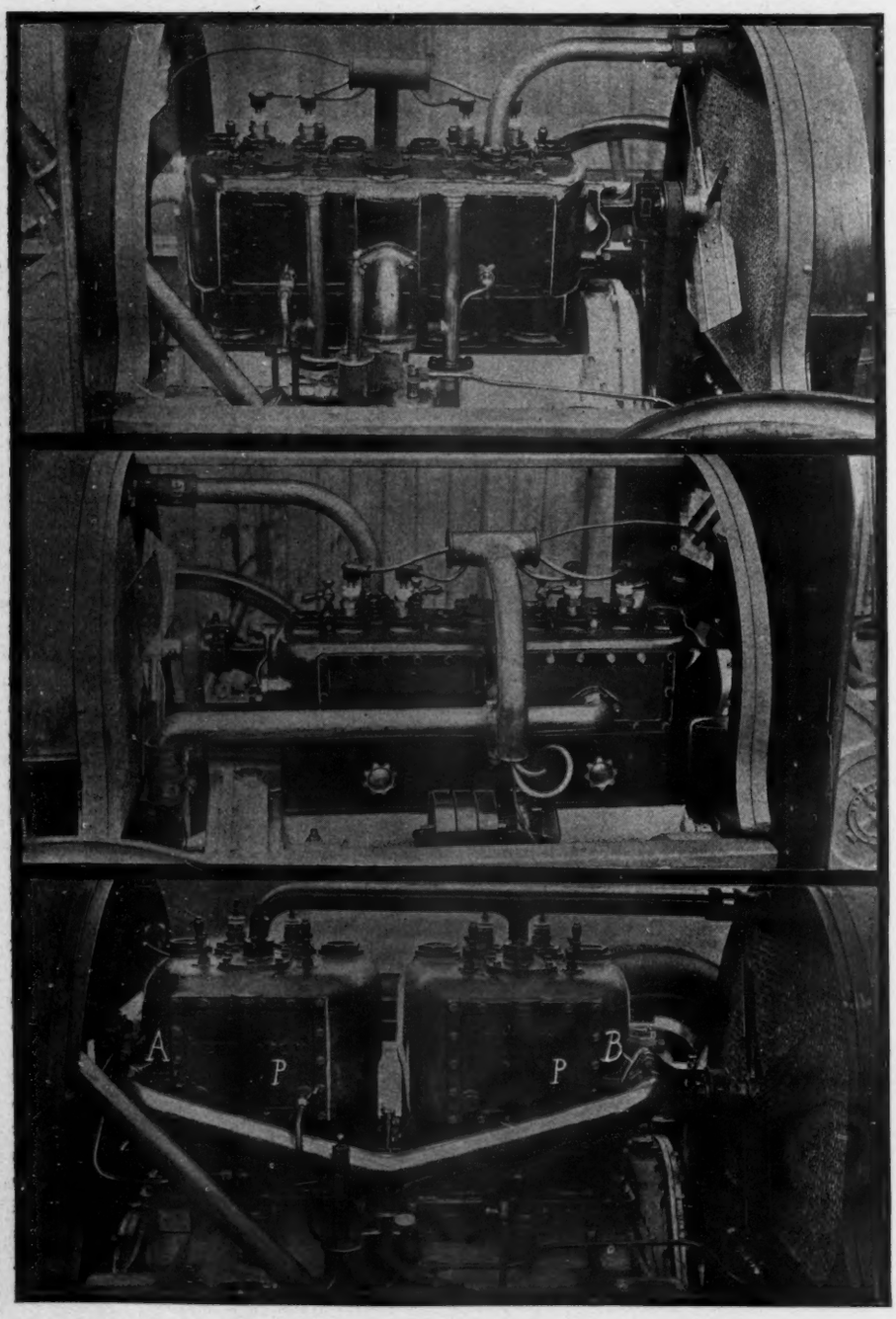
The 53,669 therefore are all the privately-owned and fit-for-service cars France possesses. No similarly reliable figures are available from other countries, registrations alone being no guide, for they make no deduction for changes of ownership or for cars that have gone to the scrap heap. If such figures could be obtained, it doubtless would be found that France was third in the list, being a very long way behind America, and very near to Great Britain.

The increase of 8,900 cars probably represents an addition of about 10,000 motorists to the ranks during the past 12 months, for some account must be taken of cars that have disappeared through old age or accidents. The increase has been general throughout France, every department for which returns are made showing that it possesses more private motor cars than it had in 1909. Paris and district has a very substantial lead, the number being 10,045 for the department of the Seine, which comprises the capital and the immediate surrounding district. The actual motor vehicles on the road would be nearly double this if account were taken of commercial vehicles, taxicabs, motor cycles, and manufacturers' and dealers' cars. Excluding all these, there is one private car in Paris for every 365 inhabitants. At the other end of the list comes the island of Corsica, with only sixteen cars, or one for every 18,475th inhabitant. While Paris and district has increased its number of private cars by 893, Corsica has added but three to its fleet during the last 12 months. There are ten departments possessing more than 1,000 private cars, and only six owning fewer than 100. All six are barren, mountainous districts, so it is not surprising.

The average horsepower of the 53,669 cars in France is only 13. But the Frenchman always has a low-powered car when he deals with the taxgatherer. The treasury has declared that a four-cylinder motor of 3.1 inches bore must develop 12 horsepower, and that out of a 4-inch bore the manufacturer must get 21 horsepower. Although the motor may have a stroke of 10 or 11 inches and run at 2,200 revolutions a minute, neither the manufacturer nor the owner will be foolish enough to declare it at more than the treasury rating when listing it for taxation.



FIGS. 1 AND 2—SIX-CYLINDER DELAGE MOTOR, 2.5 BY 4.9-INCH BORE AND STROKE



Details of the Latest French Motors for 1911

CHICAGO, Nov. 22.—In Motor Age, November 10, pages 20, 21, 22 and 23, were published some of the latest details of design on French cars. Unfortunately, at that date the illustrations had not arrived. Of cars described three leading types are illustrated herewith and a brief synopsis of some of their leading details reproduced from the pages referred to for the convenience of the reader.

In Figs. 1, 2 and 6 the new six-cylinder Delage is illustrated. It is one of the few French examples in which the six-cylinders are formed in one casting, and in which the intake and exhaust manifolds are a corporate part of this cylinder casting. The cylinders have a bore of 2½ inches and a stroke of 4.9 inches, which is practically a ratio of one to 1.9. In recent French tests this motor has shown up particularly well. The test continued for 10 consecutive days, the motor running 10 hours a day at 1,800 revolutions per minute, which is the normal speed. During this entire test it never fell once below 28 horsepower, and with the motor speed accelerated to 2,000 revolutions per minute the horsepower of which was increased to 30. In spite of the fact that this car uses six-cylinder motors, the wheelbase is 110 inches, and the hood, as illustrated in Fig. 6, is not larger than the ordinary four-cylinder one. This motor is looked upon as one of the cleanest cut jobs on the French market. The crankshaft is supported on three bearings, a plain one at either end, and a ball bearing in the center.

In Figs. 7, 8 and 9 are shown some details of the long-stroke Gregoire with its bore of 2.1 inches and a stroke of 5.2 inches, giving a ratio of bore to stroke of 1 to 2. It has a horsepower

FIG. 3—HOTCHKISS MONOBLOC MOTOR
FIG. 4—HOTCHKISS MONOBLOC MOTOR
FIG. 5—HOTCHKISS BIG MOTOR

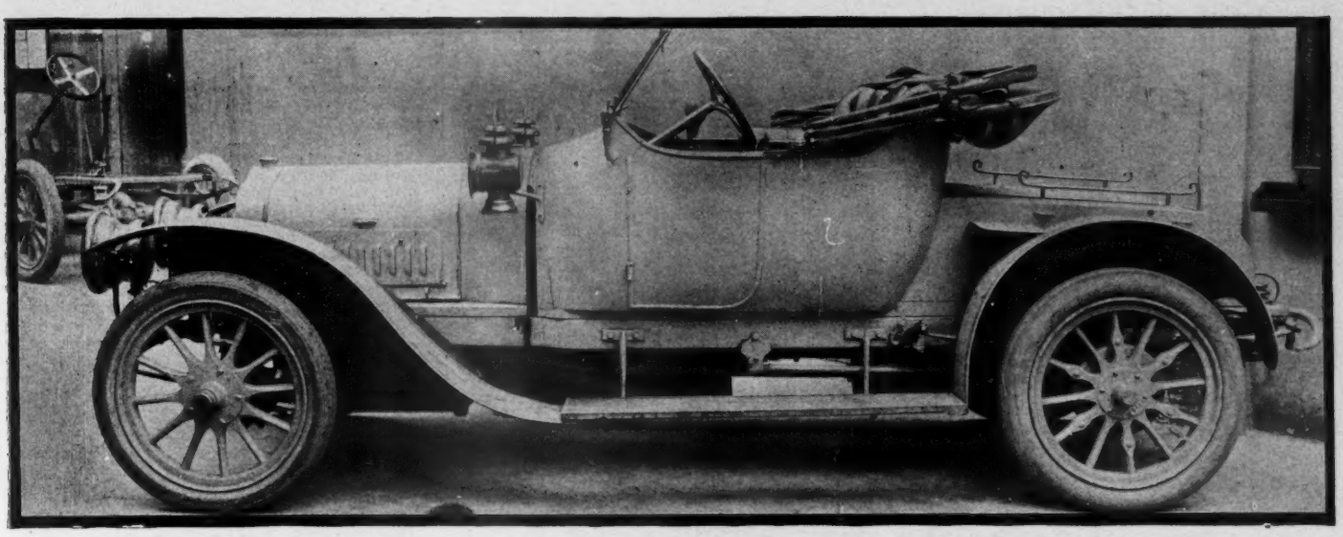


FIG. 6—SMALL RUNABOUT CARRYING A SIX-CYLINDER DELAGE MOTOR, WHEELBASE 110 INCHES

Six Cylinders Formed In One Casting Now

rating of 12 in France, 15 in England, and by bench test 30. One of the details in conjunction with the motor, Fig. 8, is the use of a Renolds silent chain for driving the camshaft and magneto shaft. The sprockets S and S1, over which the chain C passes, are shown in the illustration. Another detail brought out is the long connecting rod R perforated from end to end to reduce weight. Contrary to general practice the drilled crankshaft for lubricating the lower ends of the connecting rods is not used. A forced feed oiler delivers lubricant direct to the three crankshaft bearings and also directs a stream onto the lower ends of the connecting rods.

The Hotchkiss company for next year has confined its changes to details. On two of the smallest models with cylinders 3.1 by 4.7 and 3.7 by 4.3 inches, monobloc castings are used for the four cylinders. All of the other models have the cylinders cast in pairs. Although the Hotchkiss is one of the leaders in the use of ball bearings for crankshafts, this practice has been discontinued and plain bearings are regularly used. Figs. 3, 4 and 5 show details of Hotchkiss motor design, showing the monobloc motor, and also the larger size with twin castings. A noted point of interest, Fig. 5, is that the intake manifold unites with the cylinder castings at points A and B, which makes the manifold particularly long. No reason is advanced for this construction. In order to facilitate manufacture of the cylinder castings inspection plates P forming practically a complete side of the water-jacket are used. On all models covers for the valve springs and lifter rods are used on all of the models.

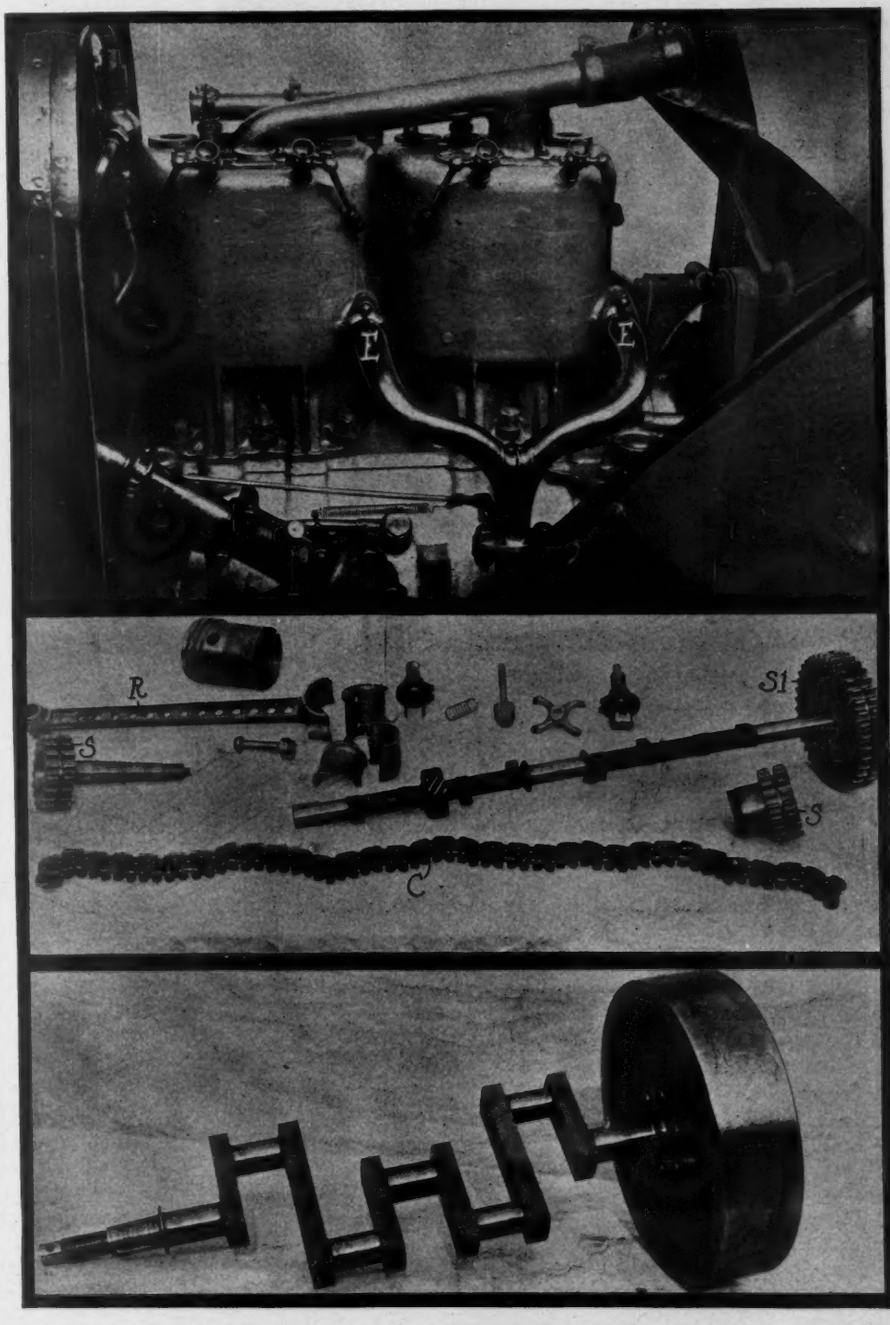


FIG. 7—GREGOIRE LONG-STROKE MOTOR
FIG. 8—GREGOIRE MOTOR ASSEMBLY
FIG. 9—GREGOIRE CRANKSHAFT

REQUISITES OF THE TOURIST

SAVANNAH, GA.—Editor Motor Age—The need for special equipment on a tour is usually overlooked, and one regrets his inadequate equipment most when mired deep in the black gumbo of southern Illinois or the brown slippery mush of northern Ohio. Equipment is half the success of a long tour, and it is in this as any other undertaking, the little details count for so much. Having recently completed a trip of 10,000 miles in an Ohio 40, the roads and weather conditions surrounding the trip forced me into a thorough consideration of this article; and my equipment could be emulated and found of much value to the overland tourists.

Strapped to the tool box on the footboards were carried a regulation spade and axe; in the tonneau, built to hook the robe rail, was a weather-proof pantasote pouch, in which handily packed were raincoats, rubber coats and a pantasote dash shroud, which buckled closely over the dash up along the front seats, encircling the steering post and serving as a warmer in cool nights and mornings, and a proper shed for the rain. Hooked to one of the top irons was a single sheave block and tackle with 50 feet of rope. Four pairs of chains served in climbing out of ditches during slippery weather, as the front wheels will hold the road truer, giving the rears better purchase. Two jacks and sheet metal stands for same were included, for when one runs into mud the jacks, if used, sink out of sight unless some stand is provided. Two tire pumps! but one may ask "Why two tire pumps?" On a long tour you may have more than the ordinary amount of tire trouble, producing proportional amount of pump work. One may as well adjust his togs for a long walk to the nearest garage, if out in the country; or await the passing of another vehicle if this one pump, for many invisible reasons, fails to work. Under such conditions, happy is the tourist with the extra tire pump.

The Official Automobile Blue Book, an electric pocket flashlight, pocket compass and speedometer should be interlinked in their service to produce good time in traveling. With one driving, the other reading and keeping good watch, you avoid the aggravation of losing the route. When the reader calls the mileage the speedometer should be consulted, and called when nearing its limit. If the mileage called has been overstepped and land marks, quoted in the Blue Book do not appear correct, pull up and avoid straying farther by taking proper bearings with your compass and relative position of towns on the Blue Book map. Incidentally have your speedometer set high up on the dash, where a man need not crane excessively to read the instrument.

As for night driving, I credit the ability to turn up 4,140 miles in 18 days, averaging 230 miles per day, to the pocket flashlight, with the reader and Blue Book in constant touch. A good pair of headlights robs night riding of its road uncertainties. Strap your front springs with good heavy straps, the cost of which is a shadow to a spring replacement and its incident bother in some far-off town, and the galloping tendencies of the forward part of the car, over bumps and ruts is reduced about 50 per cent, the car going up just once and coming down.

The mud-covers found necessary were for magneto, carbureter, radiator, head and taillights. Rather an expenditure of 20 minutes fitting a linoleum mud-protector than a few hours' waiting for a shorted magneto to dry; rather 15 minutes to protect the auxiliary air intake of a carbureter than 30 minutes taking it apart to clean the mud out; rather 5 minutes attaching the radiator mud apron than boiling troubles, and the lengthy job punching the mud out of the radiator squares with a nail. Head and taillight lamps also repay being kept covered.

Carry a collapsible water bucket, a gallon can or so of oil, preferably the kind a motor is used to. You may need it on the road, or where good oil cannot be obtained. If you are without a strainer system in the gasoline line, drain your carbureter each morning and avoid engine troubles. When a hard day's work through sand or mud has been delivered the motor will give positive thanks for a small amount of kerosene in each cylinder before leaving the garage at night.

Never disregard local information. Many a 15- to 20-mile circuit has repaid a 3-hour waddle in the mud, and if actually stuck, time, temper and dirt can be saved by using the proffered team. After all, a car is only as fast as the road it travels, and a word on preparatory touring equipment is a word to the wise.—L. A. Prince.

PROBABLY POOR CARBURATION

Bigelow, Kans.—Editor Motor Age—I would like to know through the Readers' Clearing House what is the trouble with my E-M-F car. With any load whatever the engine misses fire when running up to 15 miles per hour, but from 15 to 25 miles per hour it will work all right. It misses on the lower gears at about the same engine speed. If I open the throttle quickly it is worse than if I open it gradually. Last winter I had the same trouble and the company sent me a new magneto, but it did not remedy the matter. I also have put on new valve springs, ground the valves, cleaned out the carbon, put on a new float in the carbureter, put in new plugs and examined the inlet manifolds. I have tried driving with two cylinders short-circuited, and the other two would work perfectly, regardless of which ones I short-circuited.—A. E. Hawkinson.

Your trouble seems to be due to poor carburetion at speeds up to 15 miles an hour. This may be caused by a poor adjustment of the carbureter, or to a leak in the inlet manifold between the carbureter and that section of the inlet pipe which is attached to the cylinders. It would be advisable to test the inlet manifold with a cloth saturated with gasoline; wrap it around the joints in the inlet pipe while the motor is running at low speed and missing, and see if the missing ceases when the clothes are in place. A

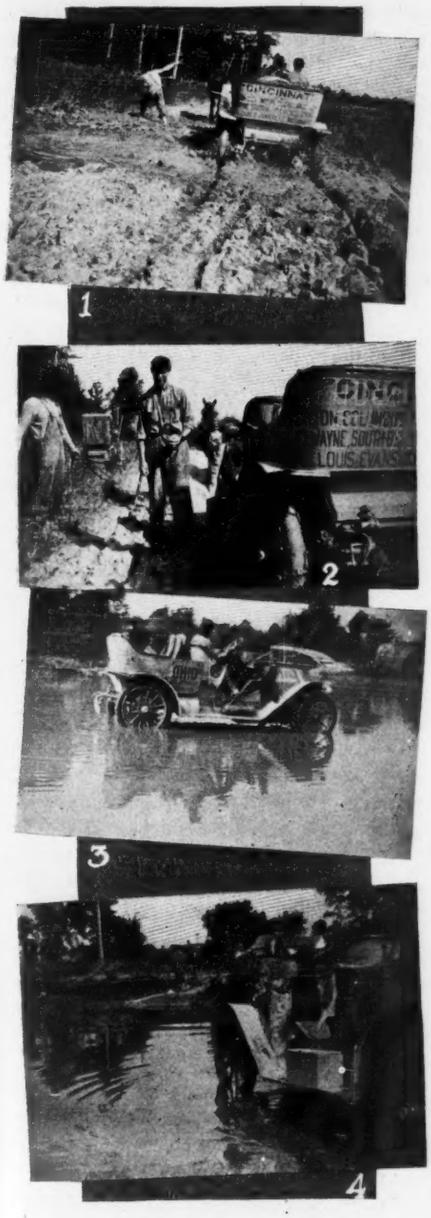
The Readers'

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

1—Type of Northeastern Ohio Road
2—Hand-Power Ferry Across White River
3—L. A. Prince at Wheel
4—On an Illinois Road

Clearing House

EDITOR'S NOTE — In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.



1—Roads Indescribable
2—Between Clay City and Mobile, Ala.
3—Crossing Small Ford in Pennsylvania
4—Crossing White River in Indiana

few turns of a saturated cloth also should be wrapped around the manifold between the carbureter and the section attached to the motor and moved back and forth, so that in case there should be a crack or hole in this section it would be covered by the cloth, at which time the missing would cease. It might also be well to disassemble the carbureter, noting carefully the proper arrangement of the parts so they can be properly assembled again, and see that it is clean and in good working order. A hot-air tube connected to the air inlet of the carbureter, which would draw hot air from the vicinity of the exhaust manifold, perhaps would eliminate much of your trouble.

WATER IN GASOLINE

Nashville, Tenn.—Editor Motor Age—I have read with interest the communication from Motorist, Quincy, Ill., in Motor Age, issue November 10, page 27, relative to the trouble he is experiencing with his 30-horsepower Maxwell, and wish to state for his benefit that I had the same trouble with my model 10 Buick. I remedied it. I knew the magneto was all right, for it had just been overhauled at the Remy factory. It ran all right for 3 days, but on the fourth day the trouble was the same as Motorist is having. I knew it was not carbureter trouble, for I had regulated that but without avail. I concluded there might be water in the carbureter or the needle valve stopped up. I took off the carbureter, which is a Schebler; cleaned it out, also the feed pipe, by allowing a cupful of gasoline to run through it after putting it on the car, regulated it on both low and high throttle, and the trouble was gone, which proves that the regulation of the gas was wrong because of the presence of water. As soon as a sufficiently large quantity of water gets into the needle valve the motor stops. On high spark and motor speeds the suction is greater and quicker and the gasoline passes by the water, but in small quantities, and this causes back-firing.—M. E. Grupp.

COLD WEATHER PRECAUTIONS

Manchester, Ia.—Editor Motor Age—Through the Readers' Clearing House will Motor Age kindly answer the following questions:

1—What can be mixed with the water in a gas generator to keep water from freezing?

2—What per cent of alcohol, or other liquid, can and must be used—say to protect down to zero?

1—The subject of anti-freezing solutions for radiators of motor cars is quite thoroughly covered in Motor Age, issue November 10, page 32. The calcium chloride solution is not adaptable for use in an acetylene gas generator, as in its usual form it contains an acid which has an action and chokes up the gas passages. If calcium chloride is absolutely pure, however, it may be used with safety. A solution of twenty parts of calcium chloride and eighty parts of water freezes at about 5 degrees Fahrenheit above zero; but even less can be used, as the interior of the generator does not usually get that low.

2—Denatured alcohol up to as high as 25 per cent may be used without affecting the lights. There is very little loss from evaporation. Fifteen per cent alcohol and 10 per cent glycerine has been used, but alcohol alone is to be preferred.

LOCATING A KNOCK

Lawrenceville, Ill.—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell me how to locate the knock in my 1910 Jackson model 40. It pounds on a hard pull and on a light pull, but on level roads goes fine at from 10 to 30 miles per hour. I have had the crankshaft bearings all adjusted, but still it pounds.—F. B. Bunn.

Assuming that the connecting rod bearings, and especially the center bearing and the one at the flywheel end of the crankshaft, still are in proper adjustment, the only other plausible cause for your trouble is that a wristpin bearing is loose, in which case it would be necessary to fit a new bushing in the wristpin end of the connecting rod or rods whose bushings are worn. To test for loose connecting rod or wristpin bearings, try short-circuiting each of the cylinders a few times individually while the motor is running. This may be done by loosening the cables on all the cylinders so that they may be slipped on or off readily, then while the motor is running disconnect and connect the cable and plug of one cylinder at a time several times in succession.

STARTING A COLD ENGINE

Chicago—Editor Motor Age—Will Motor Age please advise a number of cold weather motorists, who find it necessary to prime their cylinders to facilitate starting, what to add to gasoline in order to make it more volatile. The general practice has been to carry a long-nosed can filled with gasoline, which is injected through the petcocks, but I am advised that there are one or two substances which can be mixed with the gasoline advantageously. It is no joke to start a big four or six after it has been exposed for many hours in weather approximating zero. —W. C. T.

There are two substances which, when mixed with the fuel of a gasoline motor, are claimed to increase the speed and heat of its combustion after the motor is running at high speed, but these would be no use in starting a motor cold. The substances referred to are ether or picric acid and sal ammoniac. Ether, diethyl ether $(C_2H_5)_2O$, a substance obtained by the action of sulphuric acid upon alcohol, is a mobile colorless, inflammable and very volatile liquid, with a specific gravity of about .72 at ordinary temperatures. This, if mixed with the gasoline in proportions of 3 ounces of ether to 5 gallons of gasoline, used for priming the cylinders, might be employed advantageously. A priming can containing it, however, must be of such design that it can be tightly closed; otherwise the ether in the mixture soon would evaporate. The best course to follow is to avoid adulterations of this sort

and secure from the Standard Oil Co. a specially volatile grade of gasoline for winter use. It will cost more but will eliminate much laborious cranking and fussing around the engine, which is not always as clean as it might be.

HOME BATTERY CHARGING

La Salle, Ill.—Editor Motor Age—Storage batteries, such as those used for motor car ignition and lighting, are rather expensive to maintain, as they should be charged at least every 6 weeks, even when not in use. Batteries that do not receive this attention cannot be expected to have a long life or give satisfactory service. However, anyone having a residence or place of business lighted by direct current can charge his own batteries without increasing the electric light bill 1 cent, by the following method:

For convenience in connecting, charging and testing batteries it is necessary to make a charging board. To make the charging board, secure an 8-volt miniature switchboard voltmeter, which can be bought at any electrical supply house for from $2 up. Also an ordinary electric lamp wall socket, a snap switch—one which indicates on and off—and an ordinary electric door bell push button. Mount these on a hardwood board measuring 15 by 6 inches. The accompanying illustration, Fig. 1, shows the method of wiring the charging board and connecting it to the electric light wires.

To make a neat job of the wiring, deep grooves should be cut in the back of the board in which to imbed the wires, bringing them out through holes to the voltmeter, push button and socket. Before connecting the electric light wires to the charging board, test them for polarity by holding the two wires about 1 inch apart in a glass of water, with the lamps turned on. The wire from which the bubbles arise is the negative pole. This wire should lead to the binding posts, marked —, of the voltmeter and the battery. To connect the battery to the charging board use twin flexible lamp cord and a regular attachment plug to screw into the socket. Before attempting to charge your battery read carefully the directions given by the maker.

Let us assume that it is a 6-volt, 60-ampere-hour battery, and the charging rate given by the maker is 5 amperes. Also that the lighting circuit to which the charging board is connected carries ten 16-candlepower lamps. A 16-candlepower lamp consumes ½ ampere, therefore when all ten lamps are lighted, the battery is receiving its maximum charging rate. If fewer than ten lamps are turned on the battery can be charged just as well, only it will take longer. It is this fact which makes the above method so economical, as the lamps serve a double purpose of illumination and controlling resistance for the charging current.

To test the battery turn on all ten lamps and press the button which connects the voltmeter. When the voltmeter shows 7½ volts the battery is fully charged. To test

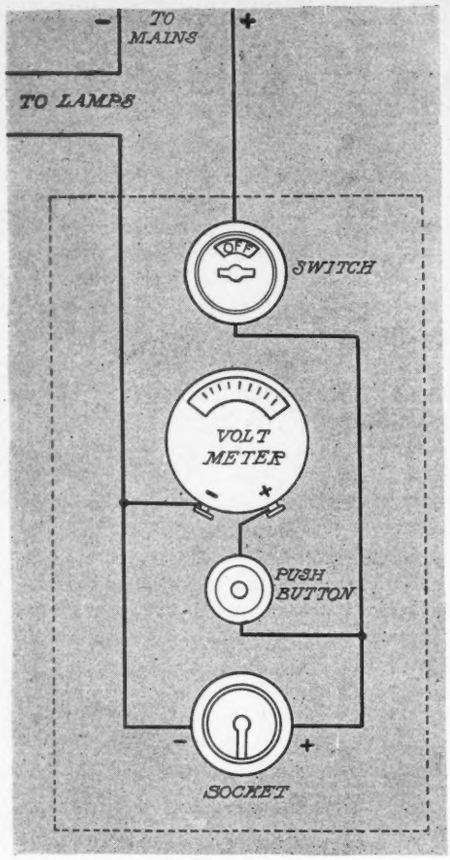


FIG. 1—HOME BATTERY CHARGING

the battery without the charging current flowing, turn off the switch and press the button. The voltmeter will then indicate 6½ volts. Never press the button with the switch turned on and the battery disconnected, as the voltmeter will then receive 110 volts, which will injure it. When through charging, replace the connecting plug with an Edison fuse plug. If tungsten lamps are used, add the wattage of the lamps and divide by the voltage to determine the amount of current flowing when all the lamps are lighted. For instance: If there are five 80-watt, one 60-watt, one 40-watt and two 25-watt lamps, the total wattage will be 550. Dividing 550 by 110 volts= 5 amperes. Of course the lamps burn slightly dimmer when the battery is on, but the difference is hardly noticeable, especially when tungsten lamps are used. This method of charging batteries cannot be used with alternating current.—John Sedelmaier.

NOISY GEARSETS

Port Gibson, Miss.—Editor Motor Age—Will Motor Age kindly answer through the Readers' Clearing House the following questions?

1—I have a touring car, weight 2,700 pounds completely equipped with Brown-Lipe transmission, selective sliding three forward and reverse. It is too noisy on low and intermediate speeds. Why is this, and how can I remedy it?

2—This car drives through springs and after going over a large bump there seems to be a drag or braking effect to the speed as the car rises on the rebound. The car has only one set of brakes on the rear wheels, internal-expanding, and an emergency and foot brake on the transmission. What causes the drag?

3—The car has two Spicer universal joints and spur-gear differential, and after a long or hard run the differential housing is almost too warm to bear hand on it, and it has plenty of grease, too. What could cause this?

4—It has Hyatt roller bearings in the rear axle and one wheel seems to set in at the top and on jacking up there is about $\frac{1}{16}$ inch in play up and down of the axle. Yet the rollers seem to be tight. Kindly advise me what to do.

5—Is it wrong to use a car when three out of eight spring leaves are cracked?—L. B. Allen.

1—Almost all gearsets are inclined to be noisy on the low and intermediate speeds, the more or less amount of noise depending primarily upon the design and construction of the gearset; secondarily upon the adjustment and condition of the teeth as regards the amount of wear to which they have been subject, and finally upon the amount and nature of the lubricant in the case. If your gearset is more noisy now than when you got it you may attribute the cause to either an insufficiency of grease, loose bearings, or worn gear teeth. If adjustment is necessary the sooner it is attended to the better, for maladjustment of the main and countershaft bearings greatly increases the wear on the gear teeth and bearings as well. If the bearings are not adjustable, new ones should be fitted. To ascertain if the bearings are worn, put the gear-shifting lever in neutral, open the cover of the case, take a firm hold of the shafts, one at a time, and try to shake them; if there is any lost motion in their bearings it can easily be felt. If the trouble is due to worn gears, there is nothing to do but put up with the noise or have new gears fitted. To thicken the gearbox grease with flake graphite is recommended to reduce noise, and sawdust mixed with the lubricant is also claimed to have been effectively employed. Motor Age, however, does not favor the latter.

2—If your brakes take hold harshly, grab so to speak, when they are applied, your trouble probably can be remedied by putting a little oil on them. Some brakes are designed without proper allowance for the action of the springs, so that when the extremes of the relative movement between the axle and frame are reached the brakes are automatically applied to a slight extent; and if the adjustments are fine, and there is a tendency on the part of the brakes to grab when regularly applied, it is possible that they bind a little on going over a bump.

3—It would be advisable for you to jack up the rear axle of your car one side at a time and then try to turn each wheel when it is jacked up and see if both turn with

a reasonable amount of freedom. It is possible that one of the shafts of the rear axle is sprung so that it causes one or more of the bearings to run warm; the driving gears may be out of adjustment, though this would not be apt to cause the heat; and it is most probable that one of the inner bearings is damaged. This trouble might also be the cause of the binding action felt on the rebound as mentioned in your second question.

4—There should be no up and down play in the rear axle bearings; they should be perfectly tight in this respect, but still free enough so that the wheels can be easily turned when the gearset is in neutral. It would pay to have a conscientious repairman look over your rear axle and gearset.

5—It is wrong inasmuch as there is danger of the spring giving way and causing a wreck if any attempt at speed is made; otherwise it is not wrong. When three out of eight leaves of a spring are broken, it is reasonable to believe that the jolt that broke them also bent the other springs out of their original shape, and it would not be practical to attempt a repair by simply replacing the three broken leaves. It would be advisable to get a new spring from the factory and try to get credit for the good leaves in the old spring.

AGAIN THE A. L. A. M. FORMULA

Oregon, Mo. — Editor Motor Age — Through the Readers' Clearing House will Motor Age kindly tell me how to figure the horsepower of an engine or motor if you have given the six cylinders? What horsepower would a motor 3¾ by 4½ be? —H. K. Hasness.

According to the A. L. A. M. standard horsepower formula:

$$\frac{D^2N}{2.5} = \text{Horsepower},$$

in which D = diameter of the cylinders, and N, the number of cylinders, since the diameter of the cylinders of your motor is 3¾ inches and there are six of them, to use this formula, the square of 3¾, multiplied by 6, the number of cylinders, and divided by 2.5, would be:

$$\frac{3¾ \times 3¾ \times 6}{2.5} = 33.75 \text{ horsepower.}$$

CHANGING SYSTEMS

Kimballton, Ia.—Editor Motor Age—I have a six-magnet, low-tension Bosch magneto on my 1907 Rainier car, which is in good condition except the make-and-break, which I wish to change and install a dual or jump-spark system. Will Motor Age tell me if I can use the low-tension magneto, also as to the commutator, winding, and coil. I have a plain coil which I use with the battery.—M. H. Esleck.

It will not prove satisfactory to try to use your low-tension Bosch magneto for a jump-spark system. It is true, if you want to, you could take the current from your magneto, run it through a transformer coil between the commutator and distributer and send it to the plugs. Your commutator and distributer would both have to be separate from the magneto, and you would have to redesign your motor in order to get some shafts from which to drive them. It would be much more satisfactory for you to install a new high-tension magneto.

LOOK AT CARBURETER

Elgin, Ill.—Editor Motor Age—I have a model AA Maxwell which I ran about 2,500 miles this summer, and it surely was perfect. About three weeks ago it got a freak notion of missing in the left cylinder when the throttle was suddenly advanced from the closed position. When running at a speed of 12 or more miles per hour it runs perfectly; or on a hard pull at less speed it runs fine. Will skin them all at climbing and I have gotten 34 miles per hour out of it. But when I am driving slowly through traffic and over rough places on closed throttle and want to suddenly jump out and around by opening the throttle wide, or even half, it will miss something fierce and sometimes nearly die. But by either working the spark lever back and forth, or the same with the throttle, I can make it catch all right again. Until three weeks ago I could run along slowly and by pressing the throttle way down suddenly, make a very quick getaway; but I cannot do it now once out of ten times. I have ground all the valves which were all right as they were, and the compression is fine as far as I can tell. I can adjust the carbureter so it will work perfectly, but as soon as it is under load it is the same thing over again. I find no loss of power in any way, only the miss when advancing the throttle. In the morning when cold the motor starts on the right cylinder, that is the one with the short intake pipe, and will miss in the left until I work the spark and throttle a few times, then the left will catch and by speeding the motor up it will run fine. I thought myself pretty wise, but this has stumped me. I say it is in the carbureter, or the gas tends to condense in the long intake pipe this colder weather. What does Motor Age say?—F. A. Norton.

Your trouble is, as you suggest, undoubtedly in the carbureter, and that it is due to a tendency toward condensation of the mixture in the longer section of the inlet manifold is quite plausible; but it has been found that when a Maxwell motor like yours misses in the left cylinder, it is an indication of too rich a mixture, and when it misses in the right cylinder, the mixture is weak. From this it is reasonable to infer that your mixture is too rich, so that under ordinary running conditions a portion of the mixture may be permitted to condense in the inlet pipe without rendering the mixture passing into the cylinders incombustible; but when the throttle is opened suddenly, this condensed fuel in the inlet pipe which has probably formed a puddle, will be drawn into the mixture, enriching it to such an extent that it will not ignite. As the longer pipe is more free from bends and affords a more direct passage for the fuel-mixture, the cylinder to which it leads is the one most apt to be affected by an overrich mixture. Now assuming that our reasoning is correct and the trouble is due to an overrich mixture, the cause of the overrich mixture must be found. Since you have tried adjusting the carbureter without favorable results, either there is something wrong with the float mechanism which permits too high a level to be maintained in the float chamber, or the float itself is soaked and heavier than it should be, and a new float is required.

CARING FOR BRASS

Streator, Ill. — Editor Motor Age — Through the Readers' Clearing House will Motor Age tell me the best preparation for putting over brass parts of a car in laying it up for the winter?—A Subscriber.

It is recommended that if a coat of brass polish be applied to the brass of a motor car before it is laid up for the winter and not wiped off, when the car is again put into commission, it will only be necessary to wipe it off the regular way and the brass parts will be as bright as ever, or at least require but a little polishing to bring back the original luster. It is also claimed that an application of vaseline will prevent tarnish, it being simply smeared onto the bright brass parts after the car is placed in the position which it is to occupy for the winter.

STRENGTHENING FUEL

Racine, Wis.—Editor Motor Age—At different times mention has been made in Motor Age of a combination of picric acid and sal ammonia added to gasoline as a material used to strengthen the fuel. Neither one or the other is soluble in gasoline. How are they dissolved?—A. J. Jonas.

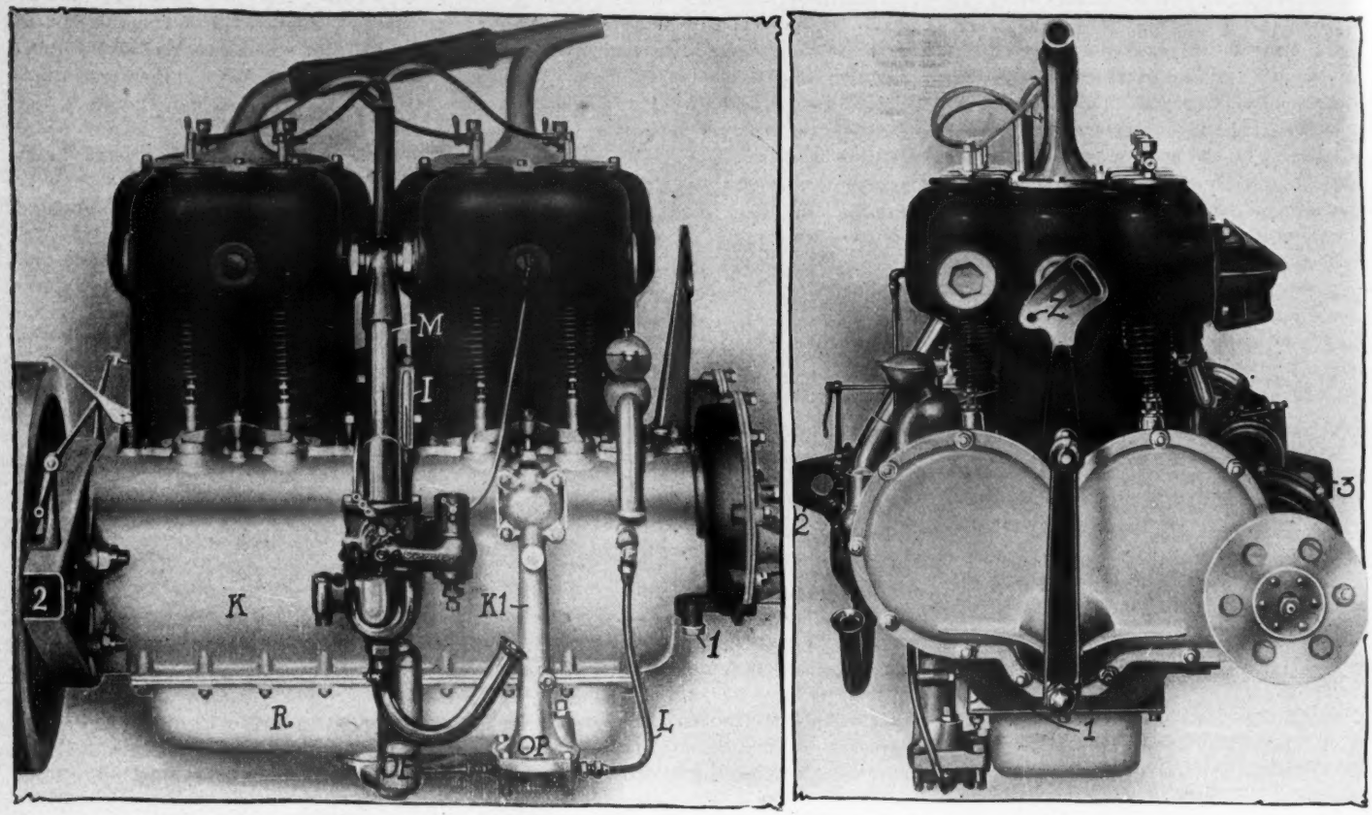
Picric acid is soluble in gasoline to about the extent of the proportions given, and ether, though insoluble, forms a mechanical mixture which is readily maintained by the shaking up of a motor car traveling at high speed. An effort is now being made by Motor Age to have the relative values of these substances for the purposes above mentioned properly tested.

IT IS WRIST PIN

Denver, Colo.—Editor Motor Age—Will Motor Age kindly inform me whether the pin that connects the connecting rod and the piston is called a wrist pin or a crosshead pin. I am of the opinion it is called a wrist pin. Am I right?—S. M. Larzelere.

You are correct in your assertion that the pin which connects the connecting rod and piston is designated the wrist pin.

STUDIES IN THE 1911 MARMON CHASSIS



FIGS. 1 AND 2—SIDE AND END VIEW OF MARMON 1911 MOTOR—M IS THE INTAKE MANIFOLD; I OIL LEVEL INDICATOR; 1 AND 2 POINTS OF MOTOR SUPPORT; OP GEAR OIL PUMP; R OIL RESERVOIR; K MAIN PART OF CRANKCASE; L OIL LEAD FROM OIL PUMP

THERE is but one Marmon chassis for 1911, which is officially known as Marmon 32. The Nordyke & Marmon Co., has in this chassis continued practically the 1910 design, with but one or two minor changes. The most important change is increase in the wheelbase from 116 to 120 inches. The valve diameter has been increased from 2¼ to 2½ inches. In practically all other respects the chassis remains unaltered, and as a result on this and the following pages a cursory study of Marmon design is given rather than any attempt being made to dwell on the program of changes for the coming season.

Each car possesses its own characteristics and in this respect the Marmon has many features which cannot be overlooked. In a word, the motor is a conventional, four-cylinder type, with twin castings and opposite valves. It is essentially a high-speed motor with its 4½-inch bore and 5-inch stroke. In many of the races in which this chassis successfully contended the motor has operated continuously at a crankshaft speed ranging from 2,500 to 2,750 revolutions per minute. The attainment of this speed has been brought about by careful construction of the reciprocating parts, namely the pistons, and connecting rods; by the use of large diameter valves 2½ inches being the diameter opening for the intakes and exhausts; and by the efficient positive lubrication of the three crankshaft bearings, the four lower connecting rod bearings, and the four wristpin bearings and pistons, the gear oil pump forcing oil under pressure to all of these eleven points.

Uses T-Head Manifold

Fig. 1 shows one Marmon motor characteristic, namely, the intake manifold M which is a straight induction pipe from the carbureter to the T-shaped union nested between the valve chambers of the twin cylinder castings. Within each cylinder casting is a waterjacketed passageway leading to the intake valves of all four cylinders. The results obtained are the same as in monobloc motor castings, in which the intake pipe is incorporated within the casting. With this construction the possibilities of condensation of the mixture between the carbureter and the intake valves is greatly reduced. The motor is supported at three points, in front at a trunnion 1 and in rear at each side at 2 by a pressed steel member. The front cylinder carries a special fan bracket with slot Z to take care of fan belt tension.

Figs. 1 and 2 in a general way reveal the leading characteristics of the Marmon motor. The tubular one-piece aluminum crankcase K is made use of, and the crank-

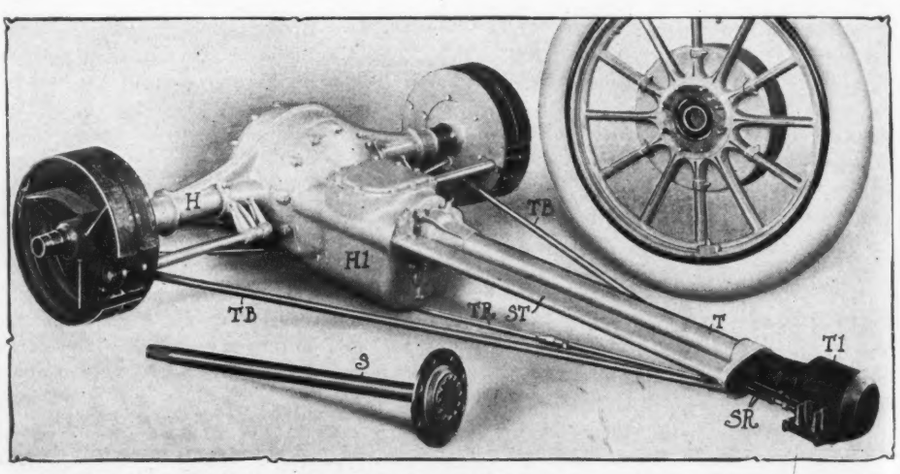


FIG. 3—THE MARMON REAR AXLE AND GEARSET TOGETHER WITH TORSION TUBE T, WHICH IS SUPPORTED FROM A CROSS MEMBER OF THE FRAME AT THE POINT T1; S IS ONE OF THE AXLE DRIVE SHAFTS REMOVED SHOWING THE LARGE END FLANGE, WHICH BOLTS TO THE WHEEL HUB; THE TWO SETS OF EXPANDING BRAKES MAY BE SEEN

shaft is entered through a plate at the rear end. The base of the case carries an oil reservoir R to which is attached the gear oil pump OP, as well as an oil well OF in which a float is located. This float carries an indicator within the glass tube I which serves as a handy means for showing the level of oil within the case. From the oil pump the entire oil supply passes through a lead L, which is best illustrated in Fig. 5. This oil lead subdivides, sending a lead L1 to the rear which delivers oil to the center bearing of the crankshaft and through a branch L3 to the rear bearing. There is also a branch delivering oil to the front bearing. Once the oil has reached the three crankshaft bearings, it is led to the lower connecting rod bearings, through what may be designated a barrel-type of crankshaft. One section of this crankshaft appears in Fig. 5. There is a large drilling N at the crankpin of the fourth cylinder, and a similar drilling N3 at the crankpin of the third cylinder. The crank cheek is drilled by a passage N2. A further drilling appears at N1, which is not necessary in the lubricating but is only used to facilitate manufacture. The oil delivered to the three main crankshaft bearings finds its way to the connecting rods through these cored passageways and once it reaches the connecting rods it is pushed along through tubes CL, secured to the connecting rods and thence to the wristpins N4. This oiling system has come to be known as the pressure system, in that oil under pressure is delivered direct to all of the eleven bearings as stated. In addition to direct pressure feed to these points, there is an overflow from the wristpin onto the cylinder walls. This overflow from the cylinder walls is splashed by the crankshaft throws and connecting rods to the crankshaft bearings. Once used the oil drains back from the crankcase proper K through a large screen H into the reservoir R, and is once more ready for circulation. The constructive details of the oil pump consist of an ordinary two-pinion pump driven from the camshaft by the pinion G. The pump driveshaft is enclosed by the aluminum case K1. It will be seen from Fig. 1 that the pump together with its driveshaft and oil leads is entirely external of the motor, and is free to be moved therefrom when the base compartment R is taken off.

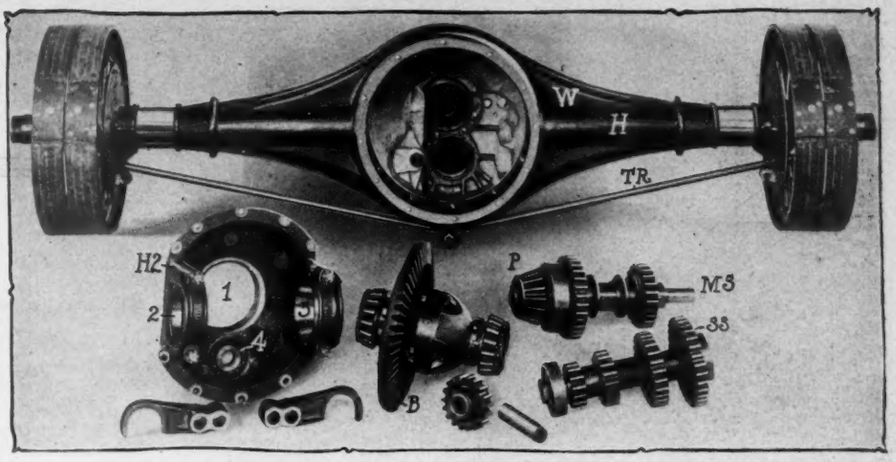


FIG. 4—MARMON REAR AXLE—THE PRESSED STEEL AXLE HOUSING H IS HEAVILY WEBBED AT W TO ADD STRENGTH; THE TRUSS ROD TR ADDS STRENGTH; THE DIFFERENTIAL GROUP B IS CARRIED IN THE PIECE H2 THROUGH TWO BEARINGS AT 2 AND 3; 1 AND 4 ARE BEARINGS FOR THE REAR ENDS OF THE GEARSET SHAFTS MS AND SS SHOWN WITH GEARS ASSEMBLED

Unit Gearbox and Rear Axle

Second only to the carbureter and cool-

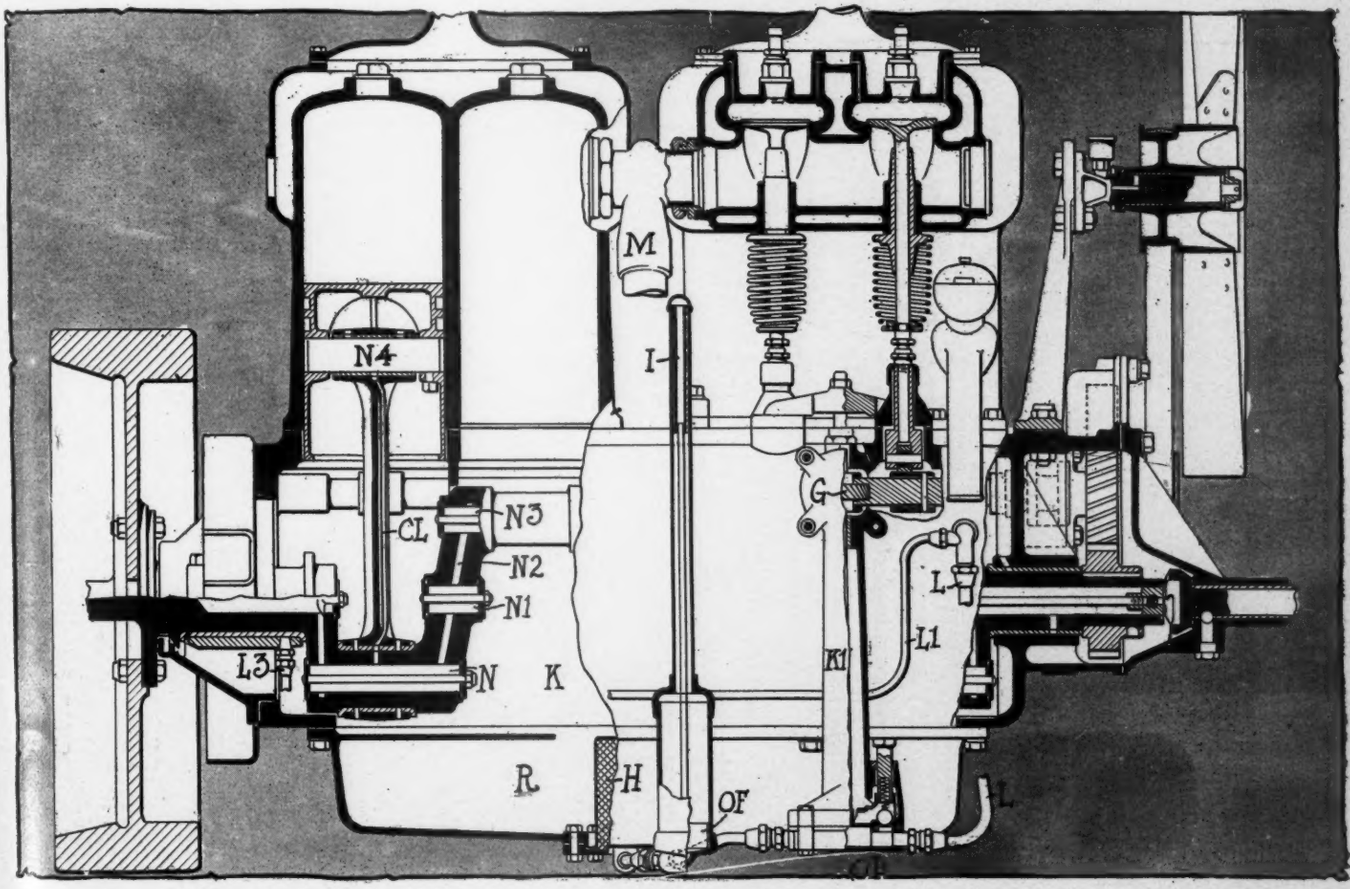


FIG. 5—SIDE VERTICAL SECTION OF MARMON 1911 MOTOR; M, INTAKE MANIFOLD; R, OIL RESERVOIR; OP, OIL PUMP; L, OIL LEAD TO CRANKCASE; G, PINION FOR OIL PUMP DRIVE; N, N1, N2, AND N3, DRILLINGS IN CRANKSHAFT FOR LUBRICATION; CL, OIL PIPE ON CONNECTING ROD TO OIL WRIST PIN N4; K, CRANKCASE; I, INDICATOR FOR OIL LEVEL IN RESERVOIR R; L3, OIL LEAD TO REAR CRANKSHAFT BEARING

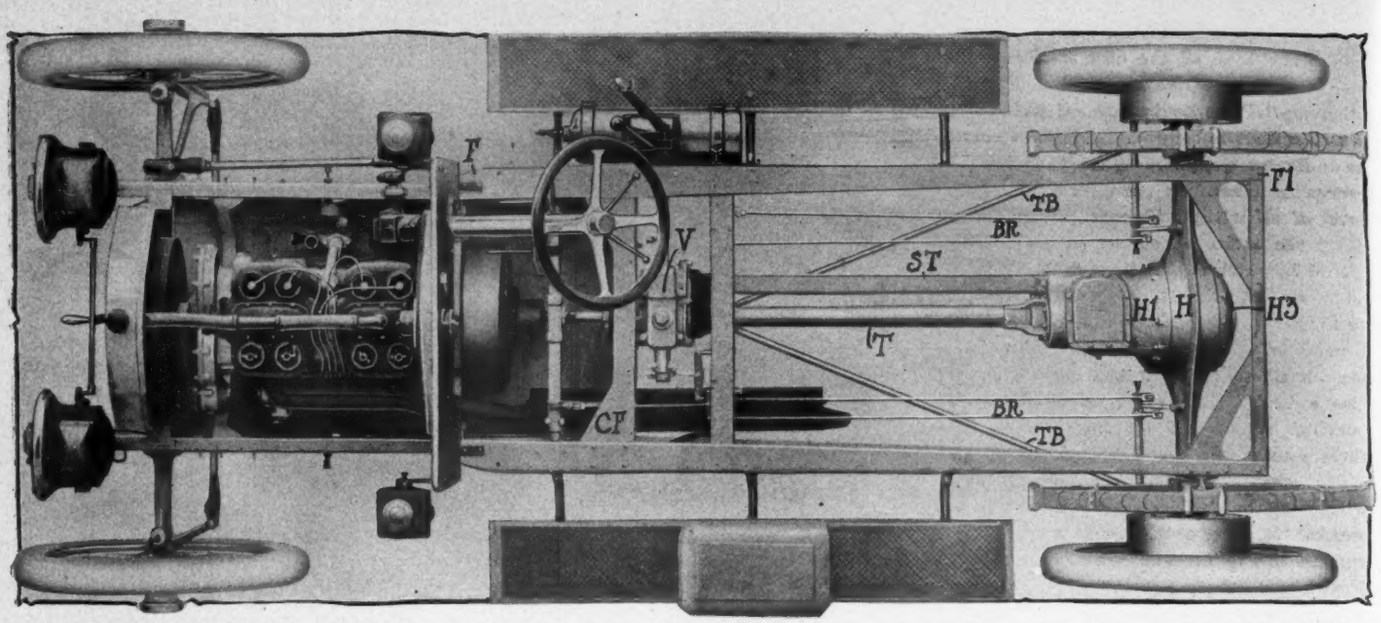


FIG. 6—THE MARMON CHASSIS—THE GEARBOX H1 IS A UNIT WITH THE REAR AXLE HOUSING H, H3 BEING THE INSPECTION COVER; THE TORSION TUBE T INCLOSES THE PROPELLOR SHAFT AND THE SHIFTER RODS OF THE GEARSET ARE WITHIN THE TUBE ST; TWO TRIANGULAR BRACE RODS TB STRENGTHEN THE REAR AXLE; THE BRAKE CONNECTIONS BR ARE INSIDE OF THE FRAME MEMBERS

ing system of the motor is the Marmon transmission system, illustrated in Fig. 3. The aluminum gearbox is formed as a unit with the pressed steel rear axle housing. This housing H, although appearing as one piece, is in reality two stampings electrically welded together in a vertical plane. Within this housing is bolted a steel plate H2, Fig. 4, serving several purposes. The differential group with its driving bevel B is carried in this steel plate with two Timken bearings being supported at 2 and 3. But this steel plate also serves at the rear end of the gearbox and at 1 is supported the ball bearings carrying the rear end of the mainshaft MS, the position of the pinion P appearing in the illustration. At the point 4, Fig. 4, is an annular ball bearing which carries the rear end of the secondary shaft SS. With the coverplate removed, as shown in this illustration, the steel plate H2 can be removed and the differential group as well as both shafts of the gearset, namely, MS and SS, withdrawn without even jacking up the rear wheels.

More complete details of this gearset appear in Figs. 7 and 8. In the former the location of the mainshaft directly above the secondary shaft appears, and the method of anchoring the steel plate H2 within the housing is seen, the same series of bolts holding this steel plate in place also serving to anchor the aluminum housing H1 forming the gearbox to the pressed steel axle housing H. This gearset gives three forward variations, direct drive being obtained by the internal sliding gear G2 telescoping with the master pinion G. Intermediate speed brings gears G3 and G2 into mesh; low speed requires the meshing of gears G4 and G5; for reverse gear G4 is meshed with gear G6, G6 in turn meshing with G7 on the secondary shaft. Every care has been taken in the matter of adequate bearings for this gearset. A double set B of annular ball bearings is used to carry the master pinion G, which is integral with its short tubular shaft. This is the shortest shaft in the set and in order to assure accurate meshing with the gear G1 as well as with the internal gear G2, the two bearings have been used. The propellershaft PS is a squared fit into the tubular pinion G. The mainshaft MS also has a plain bearing within this pinion G. The forward end of the gearbox carries two plates, one EP which supports the annular bearing for the forward end of the secondary shaft, and the other T2 supports the bearings B and has a continuation into which the rear end of the torsion tube T is brazed.

Shifter Rods Are Enclosed

A carefully-worked-out detail of this gearset is the incorporating of the two shifter rods SR within an oval tubing ST, Fig. 3. Each shifter rod carries a yoke at its forward end into which the drop arm on the gearshift lever sleeve enters, the usual interlocking devices to prevent the engagement of two series of gears at once being fitted. Enclosing these shifter rods in a tube insures adequate lubrication, results in a neater chassis appearance, and prevents any possibility of rattling. In order to strengthen the gearbox as much as possible two systems of truss rods are added; in fact, it might be stated that in all there are four systems used. In Fig 3 is the longitudinal truss rod TR extending from beneath the center of the axle housing under the gearbox and up to the forward end of the torsion tube. This truss rod is fitted with a turnbuckle for adjustment. In Fig. 4 is shown the transverse truss rod TR, extending beneath the axle. Fig. 3 also shows the two triangular brace

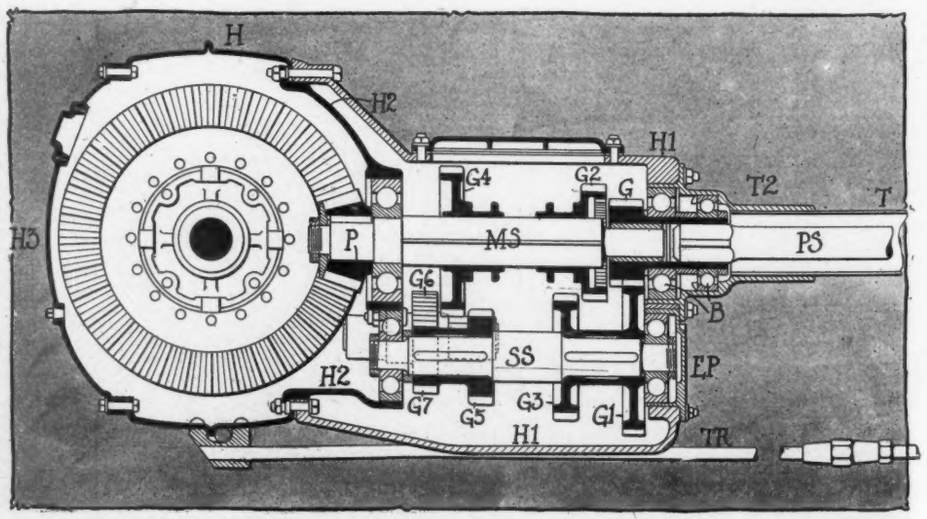


FIG. 7—MARMON COMBINED REAR AXLE AND GEARBOX—THE GEARSET HAS THE MAINSHAFT MS LOCATED ABOVE THE SECONDARY SHAFT SS; BOTH SHAFTS ARE CARRIED ON ANNULAR BALL BEARINGS; STIFFENING THE GEARBOX AND AXLE DESIGN ARE TWO TRUSS RODS, ONE TR EXTENDING FORWARD TO THE MIDDLE OF THE CHASSIS AND THE OTHER EXTENDING TRANSVERSELY UNDER THE AXLE

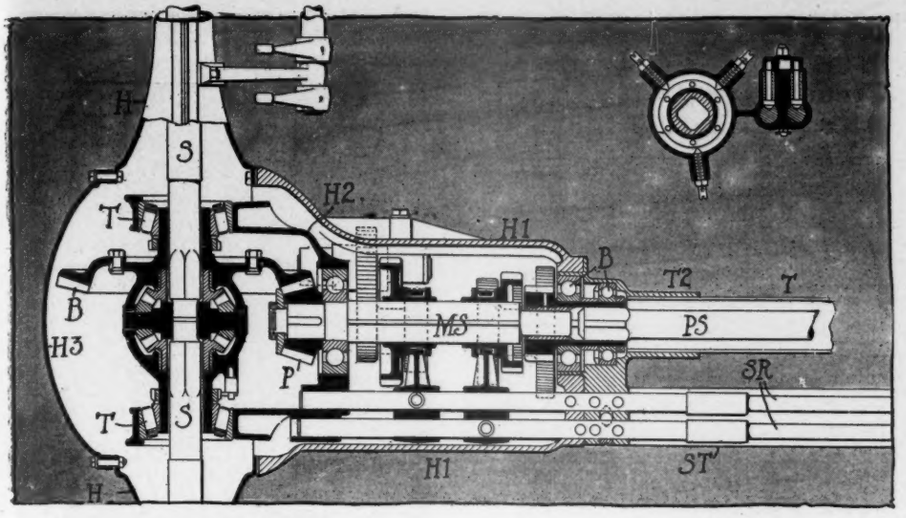


FIG. 8—PLAN SECTION OF MARMON REAR AXLE AND GEARSET—H IS THE PRESSED STEEL STAMPING FORMING THE AXLE HOUSING; THE GEARBOX H1 BOLTS TO THE FORWARD FACE OF THIS HOUSING, AND BY REMOVING THE COVER PLATE H3 THE DIFFERENTIAL CAN BE REMOVED

rods TB which in conjunction with the torsion tube T strengthen the entire rear axle construction. By mounting the complete rear axle system in a ball-and-socket joint at T1, on a cross member of the frame, a rotary movement is made possible at this point, which is utilized when one rear wheel is traveling over an obstruction.

Uses a Cone Clutch

The Marmon clutch system is illustrated in Fig. 9. Use is made of a fabric-faced cone C which has a plain bearing on the extension shaft K1 of the crankshaft. The cone C connects to a tubular hub part CH with the clutchshaft CS, so that when the clutch is disengaged the cone C together with the shaft CS is carried rearward. Using the clutch housing CH permits of entirely enclosing the clutch spring. At F is shown the crossmember of the frame which forms a ball-and-socket joint with the tubular ending T1 of the torsion tube. The propellershaft PS is carried in the torsion tube on a ball bearing B1. At V is the only universal joint in the transmission system. This is a combination universal and slide joint to permit of clutch disengagement.

The leading details of the Marmon running gear are shown in Fig. 6, which brings out in clear form the stout frame construction. The side members attain their maximum width at the point F which is the offset, where the frame is reduced in width in order to give a turning circle of shorter radius for the front wheels. From this point F to the point F1 at the rear, there is a proportional reduction in frame width. The crossmember CF is of special width and uses large integral gusset plates. Supporting the frame in front are two semi-elliptic springs 35 inches in length and with leaves 2 inches wide. These springs are mounted off center, the axle being 15 inches from the forward end of the spring. Carrying the frame working rear are ellipticts 40 inches in length and 2 inches wide.

Double Expanding Brakes

The braking system on the rear axle is confined to two expanding sets, located side by side, within the pressed steel drums on the rear wheels. Each set is 14 inches in diameter and 2 inches wide. The neat and symmetrical arrangement of the brake connecting rods BR appears in Fig. 6; these being entirely within the side members of the frame and in advance of the forward axle. The adjustment of the brakes is not by changing the length of these connecting rods but through worm-and-sector gear, which changes the position of the cam which opens the brake shoe. Both sets of brakes are faced with asbestos fabric. The forward axle is an I-section forging with Timken roller bearings for the road wheels. An option is given of 32 or 34-inch wheel diameter. As usual, the Marmon bodies are made from cast aluminum pieces, one casting forming both sides and rear of the tonneau.

MOTOR CAR LITERATURE

"The Henry 40" is the title of the 1911 catalog which the Henry Motor Car Co., Muskegon, Mich., is mailing to the trade. Specifications and illustrations of its touring, demi-tonneau and fore-door demi-tonneau roadster and roadstar models are given.

Another 1911 catalog is that of the Columbia Motor Car Co., Hartford, Conn., which describes in a conventional manner the Columbia models for the coming season.

Dressed in a dainty cover the catalog of the Reo Motor Car Co., Lansing, Mich., tells the story of the Reo cars for 1911. It is attractively illustrated and features all its models for the coming season.

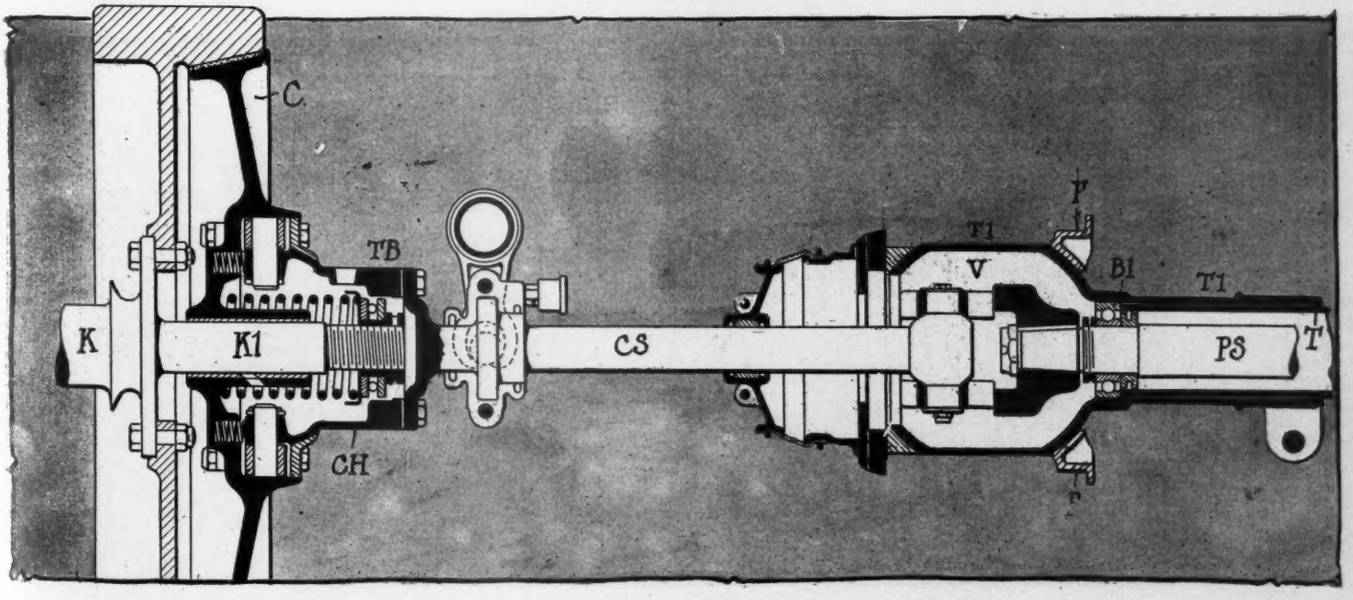


FIG. 9—MARMON TRANSMISSION SHOWING FABRIC-FACED CONE CLUTCH AND SINGLE UNIVERSAL JOINT—F IS CROSS MEMBER OF MAIN FRAME SUPPORTING THE TORSION TUBE T, WITHIN WHICH IS THE DRIVE SHAFT PS. THE ONE UNIVERSAL JOINT IS LOCATED AT V, WITH A SHORT CLUTCH SHAFT CS CONNECTING WITH THE CONE CLUTCH C

RENO—A NEW TYPE OF SLIDE-VALVE MOTOR

French Design Well Tested Shows Particular Merit

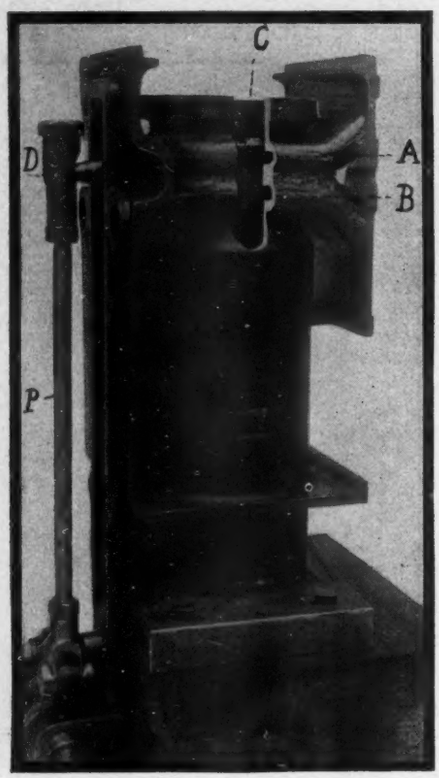


FIG. 1—IN THE RENO SLIDE-VALVE MOTOR A RING C LOCATED IN THE CYLINDER HEAD IS RECIPROCATED, UNCOVERING IN ITS RECIPROCATION THE INTAKE AND EXHAUST PORTS, BOTH OF WHICH ARE LOCATED ON THE SAME SIDE OF THE CYLINDER

EUROPE has plenty of valveless motors, but very few, ignoring of course the Knight, that have given satisfactory results under ordinary working conditions. There is an exception in the Reno, a slide-valve motor of French origin, just placed on the market by Hart O. Berg. The cylinders of the Reno have two circular ports—A and B, Fig. 1; the upper one, A, is for the intake, the lower one, B, for the exhaust. Within the cylinders is a split ring, C—a compression ring—with a face depth of about 1½ inch. This depth is sufficient for the ring to cover both ports, thus giving a compression-tight chamber. When the ring is moved upwards it uncovers the exhaust port; when brought downwards it uncovers the intake and at the same time closes the exhaust port. The main idea is remarkably simple, and the adoption of this principle results in a reduction in the number of parts required for the motor, with, contrary to the generality of slide-valve motors, a considerable reduction in manufacturing cost.

The method of operating the ring, or slide valve is simple and ingenious. A small-diameter hole is pierced in the cylinder wall, through which is passed the rocker arm D engaging in the hollow axis of the ring. In order that there shall be no leaks at this point, the ring is here increased in depth, as can be seen. Unlike the usual type of push rod operating a rocker arm for overhead valves, it is necessary in this case that a positive movement be obtained for both upward and downward strokes. This is secured by means of a bellcrank E, one arm of which is connected to the vertical pushrod, P, and the other is received between two cams, F, the lateral walls of which have the correct profile for the necessary movement of the compression ring.

In Fig. 1 a section of a cylinder, the split ring, C, covering both parts, is at the compression position. Under working conditions the push rods are contained within a bolted-on oil retaining aluminum housing.

All the experimental work has been done on a four-cylinder monobloc motor of 85 by 130 millimeters bore and stroke. As can be seen from Fig. 5, it is a remarkably simple casting. The cylinders have independent heads, shown at E, and one entire side of the waterjacket is an independent unit. Contrary to which might at first be supposed, the compression ring C works under very satisfactory conditions. It is in the

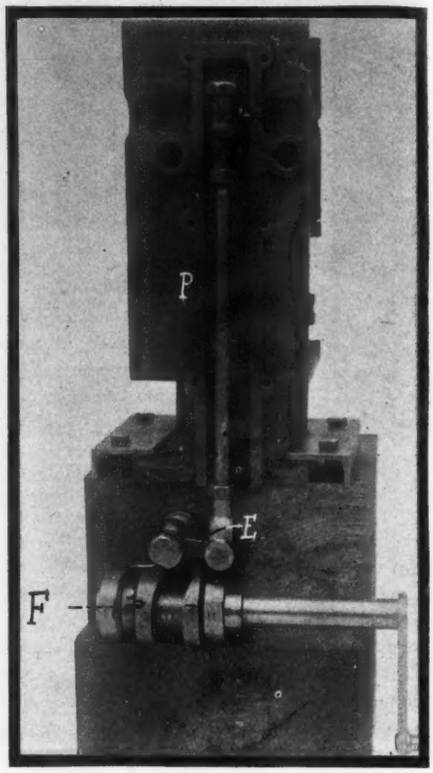
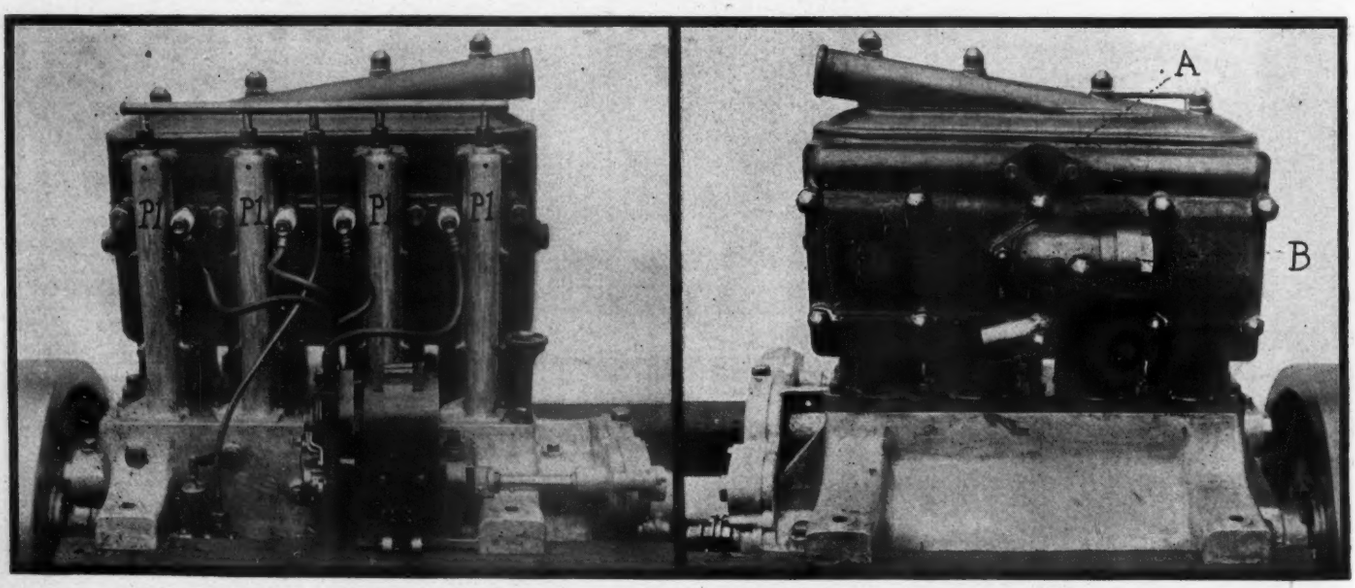


FIG. 2—IN ACTUATING THE SLIDE VALVE OF THE RENO MOTOR, THE TAPPET P IS DRIVEN THROUGH A BELLCRANK E, ONE ARM OF WHICH ATTACHES TO THE LOWER END OF THE TAPPET, THE OTHER WORKS BETWEEN THE FACE CAMS F



FIGS. 3 AND 4—TWO SIDE VIEWS OF RENO SLIDE-VALVE MOTOR. THE PUSHRODS FOR ACTUATING THE VALVES ARE CARRIED WITHIN THE CASES P1 IN FIG. 4 THE INTAKE ENTRANCE IS MARKED A, AND THE EXHAUST EXIT B. THE FOUR CYLINDERS ARE CAST IN A SINGLE BLOCK, WITH LARGE PLATES FORMING ALMOST THE COMPLETE SIDES OF THE WATERJACKETS, AS SEEN IN BOTH ILLUSTRATIONS

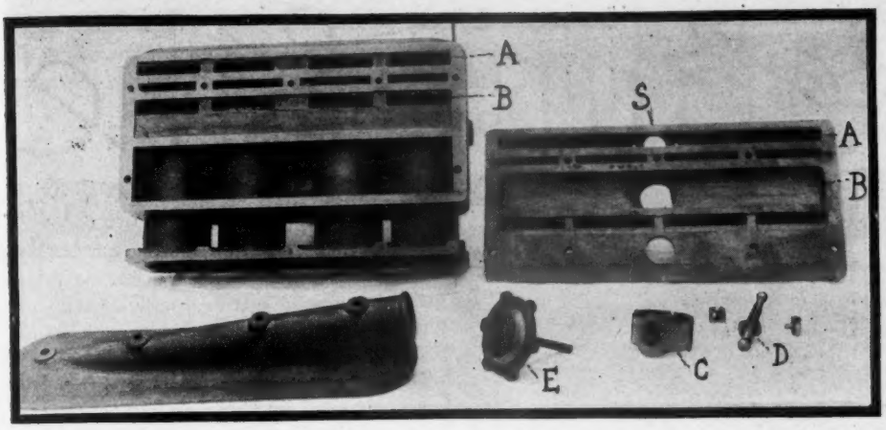


FIG. 5—CYLINDER ASSEMBLY ON THE RENO SLIDE-VALVE MOTOR. THE PLATE S FORMS ONE OUTER WALL OF THE WATERJACKET. THE INTAKE AND EXHAUST PORTS A AND B ARE SHOWN. E SHOWS THE REMOVABLE CYLINDER HEAD. E IS THE RECIPROCATING RING OR VALVE

center of the combustion chamber, but as it descends to uncover the admission port, the cool fresh gases pass directly over the hollow axis of the ring. After long bench tests and 10,000 miles on the road no breakage of a compression ring has been recorded. Further, the ring is above the exhaust port, when this latter is opened, thus allowing the spent gases to pass out with the least amount of resistance and without any additional heating of the ring. The rocker arm has a comparatively slight movement. The outer extremity, received in the vertical pushrod, works under very satisfactory conditions. The opposite end, being within the hollow axis of the compression ring, works under a higher temperature, but its ball head is made detachable and of hardened steel, so that if wear occurs it is possible to change this part without sacrificing the entire arm.

For accessibility and ease of upkeep, the motor compares well with the poppet-valve type. The vertical push rod may require adjustment, but this is carried out with the same ease as on a poppet-valve motor having overhead valves. There is practically no other part to adjust. If a compression ring should need attention, it can be got at as readily as a poppet-valve, merely by dismounting the cylinder head. For clearing out carbon deposit, dismounting of the cylinder heads is a quicker job than taking down four cylinders.

Lubrication has been provided for by means of an oil pump worked off the camshaft, which delivers oil through suitable piping to the four rocker arms, which, as can be seen from the illustration, are completely encased with their actuating rods. The supply of oil is carried along the rocker arm to the ball and socket at the inner end, a sufficient quantity passes through to the walls of the compression ring, and the surplus flows down the outside of the cylinder and within the push rod housing to a hole in the base of the cylinder through which it flows onto the connecting rod. The crankshaft bearings and cylinder walls are lubricated by splash.

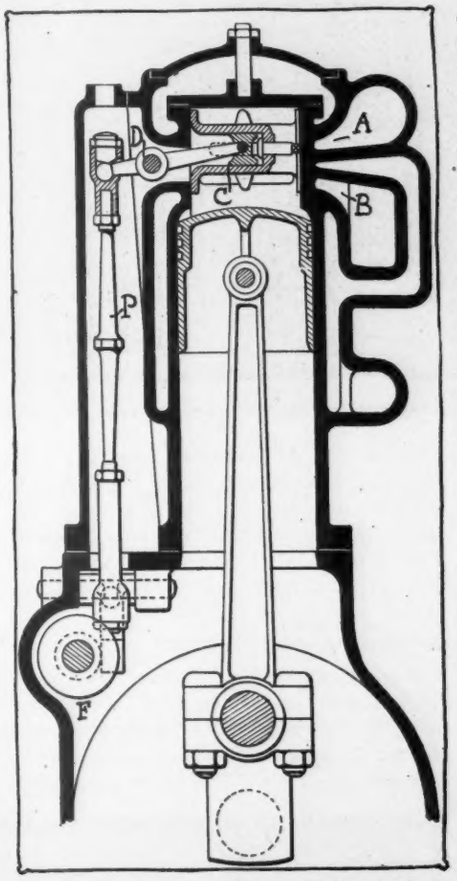


FIG. 6—END VERTICAL SECTION OF RENO SLIDE-VALVE MOTOR, SHOWING CAMSHAFT F, TAPPET P, ROCKER ARM D, RECIPROCATING VALVE C, INTAKE A, EXHIBIT B

There is nothing very distinctive about the distribution gear, for there being a single camshaft carried in the same position as on the L type of poppet-valve motor, the customary three pinions are all that are necessary. In order to secure silence, however, the designers have decided on the use of a silent type of chain for driving the camshaft and the magneto. As it is impossible for the sleeves and their actuating mechanism to produce sound, and as they can be relied on to remain silent under long service, the makers can claim to have produced an inaudible motor. A further claim, and one which appears to be well justified, is that the motor is easier and cheaper to manufacture than the poppet-valve type. The four compression rings cost less than eight poppet-valves; instead of eight push rods and rocker arms as on the overhead valve type of motor, there are only four, with, of course, half the cost of production. The casting is not a difficult one, and is of such a nature that it allows of accurate verification of the cylinder walls. Hidden defects in casting should be rare.

So far as can be judged from road tests, the motor compares favorably with the most efficient poppet-valve type. It has the advantage of big valve area, ensuring a complete filling of the cylinder and a quick and complete scavenging. At the same time the large valve area is secured without the enlargement of the combustion chamber and the loss of efficiency through the formation of pockets. The split rings have been found to retain compression as well as poppet valves in the best condition. On the bench the motor develops 28 horsepower at 1,350 revolutions, which is found to be its most efficient speed. It can be accelerated up to 2,200 revolutions a minute.

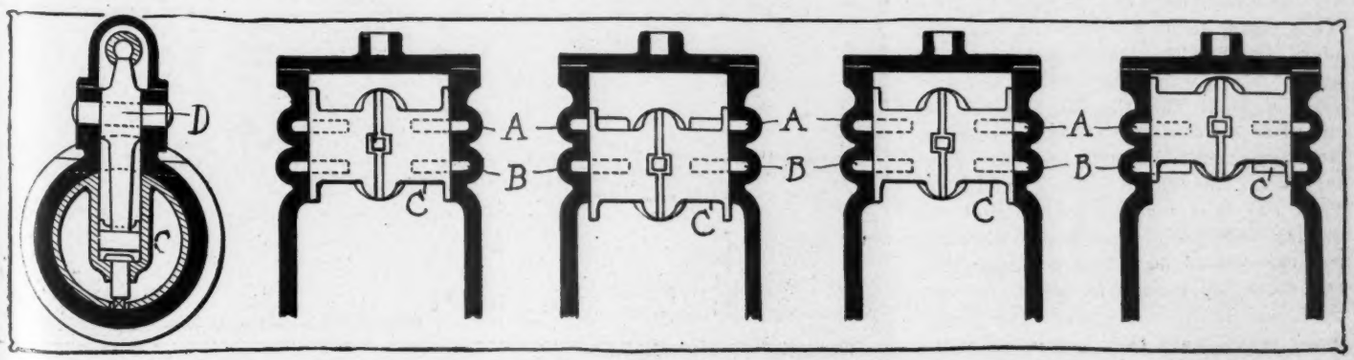
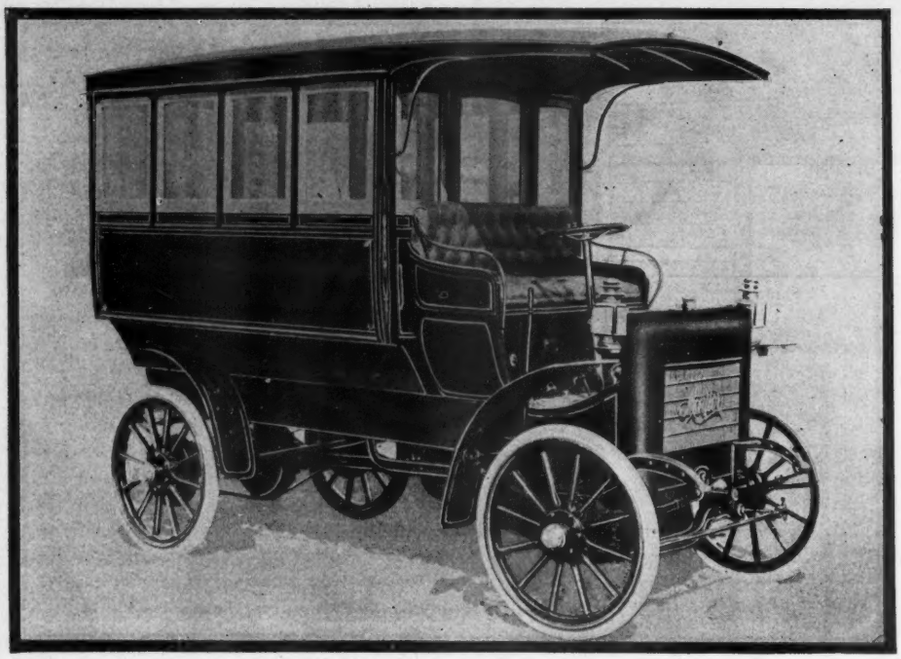


FIG. 7 FIG. 8 FIG. 9 FIG. 10 FIG. 11

IN FIG. 7 IS SHOWN A TOP SECTION OF THE RENO CYLINDER SHOWING HOW THE ROCKER ARM D ATTACHES TO THE VALVE OR RING C. IN FIGS. 8, 9, 10 AND 11 THE VALVE C IS SHOWN IN ITS DIFFERENT POSITIONS FOR INTAKE, EXHAUST, COMPRESSION AND EXPLOSION

The Realm of the



PASSENGER BUS MADE BY MONITOR AUTOMOBILE WORKS

KNOX MAKES LONG RUN

THE effect of the express drivers' strike in New York has been felt by business houses more widely than is generally appreciated, and one of the concerns that has been seriously inconvenienced is the Hendee Mfg. Co. of Springfield, Mass., which besides its regular shipments was under the necessity of getting a lot of Indian motor cycles to London for exhibition at the show, opening November 21. It was necessary that these should reach the ship in New York on October 31, but shipment by express was out of the question and there was no time to send by freight. In this dilemma the big motor truck belonging to the Hendee company was requisitioned, loaded with twelve machines and a case of parts for the London branch of the company, and the journey to New York began about 9 o'clock on Saturday night, October 29. Hartford was reached at 11 o'clock, where the caravan laid over for the night and the journey was resumed at 7 o'clock the following morning. An average of 15 miles an hour was maintained for the entire journey, and New York city was reached at 5 o'clock on Sunday afternoon, where some difficulty was experienced in finding a garage that had doors big enough to admit the big truck and its load. A refuge was finally found in a garage that houses the sightseeing stages, and on Monday morning the consignment of Indians was safely delivered on the steamship dock. The total distance covered was in the neighborhood of 150 miles, and the only delay that the Knox truck experienced was near Windsor, Conn., where a wheel sunk to the hub in soft sand, and required jacking up before it was possible to extricate it.

BOSTON'S MOTOR DRILL

Fire Commissioner Charles Daly, of Boston, has given orders that a motor car drill is to be made part of the work of the Boston department now that a motor chemical has been installed in one of the engine houses. This wagon is a Knox combination wagon and carries a crew of six men. This is the first time that any such a drill has been included in department regulations anywhere, it is believed. The drill was compiled by C. A. Young, representative of the Knox commercial department in Boston, and it comprises the work that an expert chauffeur would do in driving and caring for his machine. As Boston intends to purchase more motor wagons for the fire department, the commissioner intends to have trained men available when they are installed so that their usefulness may begin the moment they are added to the fire-fighting equipment. The drill has been planned so that all those assigned to take it will get the same benefit and in this way the maintenance will be kept at a minimum when other machines are bought, because there will be a rivalry among various crews.

MOTOR PATROL FOR LOWELL

A modern police patrol is being finished at the E. R. Thomas Motor Co.'s plant in Buffalo for the city of Lowell, Mass. The big machine is really a combination first-aid car, ambulance and general police conveyance. The car, a 70-horsepower, six-cylinder, with a closed type of body, is one of the largest machines ever turned out of the Thomas factory. Four narrow windows on the side, with solid shutters, and two larger windows in the front, furnish ventilation. The interior is lighted by a dome light in the roof. Two seats running the length of the car, and fitted with ambulance rails, will accommodate ten people. Stretchers are carried beneath the seats. The running boards on

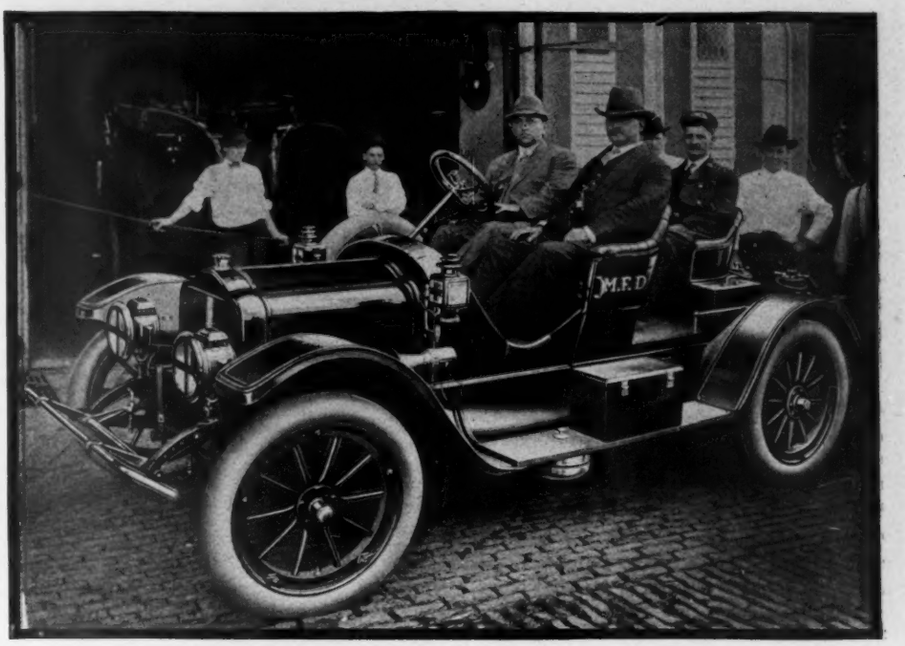
ONE DAY'S SHIPMENT OF STERNBERG TRUCKS

Commercial Car

each side are built as chests and will accommodate two riot guns, four pistols, six pairs of handcuffs, twisters, a large medicine case and copper tank for remedy for burns. A powerful searchlight is fitted to the front of the car, to be operated by the driver. He will be enclosed by the glass front and the solid projecting roof.

THE MONITOR BUS

The Monitor Automobile Works, of Janesville, Wis., has just put out a new motor bus, in the construction of which use is made of the concern's type A chassis. The body is of selected yellow poplar. The framework is second growth ash, the inside is finished is rich quarter-sawed oak, while the ceiling is of redwood trimmed with strips of white pine. The floor is provided with rubber matting, and the seats are equipped with leather cushions. There are four drop windows on each side, two in front and rear; a double seat in front and an inside capacity of ten passengers. The height of body is 65 inches, depth of seat 14 inches and width of seats 76 inches, leaving an aisle 22 inches wide.



WHITE FIRE FIGHTER USED AT MONTGOMERY, ALA.

EXPENSE OF MAINTENANCE

A Frayer-Miller truck was recently demonstrated for the Gambrinus Brewing Co. of Portland, Ore., hauling supplies for the company, and an accurate account was kept of the performance.

Left brewery at 7:15 a. m., picking up the first load at four different points in the city, first load amounting to sixty sacks malt, of 85 pounds each, weight 5,100 pounds; distance, round trip, 6 miles; time, 15 minutes light, 20 minutes loaded.

Second load, forty boxes bottles, 135 pounds each, weight 5,400 pounds; distance, round trip, 6 miles; time, 15 minutes light, 20 minutes loaded.

Third load, forty boxes bottles, 135 pounds each, weight 5,400 pounds; distance, round trip, 6 miles; time, 15 minutes light, 20 minutes loaded.

Fourth load, 30 boxes bottles, 135 pounds each, weight 4,050 pounds; distance, round trip, 6 miles; time, 15 minutes light, 20 minutes loaded.

Fifth load, thirty-five boxes bottles, 135 pounds each, one dozen empty boxes, weight 4,275 pounds; distance, round trip, 6 miles; time, 15 minutes light, 20 minutes loaded.

On two of the return trips the car carried fifty empty boxes each trip, making a total of 100 boxes of 25 pounds each, or 2,500 pounds. The total weight hauled aggregated 27,175 pounds. The total distance was 30 miles and the time 175 minutes, or 2 hours 55 minutes. The expense of hauling was: Wages of driver, 8 hours, 37½ cents per hour, $3; 6 gallons gasoline at 18 cents gallon, $1.08; 1 quart oil, 12 cents; or a total of $4.20; cost for operating truck 30 miles, $4.20, or 14 cents per mile; cost per ton, 13½ tons at $4.20, or 31 1/9 cents per mile.

STERNBERG TRUCK IN SERVICE IN MILWAUKEE

WHITE'S FIRE-FIGHTER

In addition to the White police patrol wagon already in operation in Montgomery, Ala., there has recently been added a White fire chief's runabout. This is equipped with chemical extinguishers and other necessary appurtenances for immediate work upon small fires.

TRUCK SHOW FOR PITTSBURG

A commercial truck show will be given in the city of Pittsburg from April 4 to 8, 1911, under the auspices of the Automobile Dealers' Association of Pittsburg. The regular pleasure vehicle show will be held March 25 to April 1.

From the

FROM New York to Tampa—An America 40, made by the Motor Car Co. of America, is making an endurance run from New York to Tampa, Fla.

Spangler in Twin Falls—Robert W. Spangler now is located at Twin Falls, Idaho. He has just succeeded in completing the organization of the Idaho State Automobile Association.

Chauffeurs Elect Officers—The Washington Chauffeurs' Club, of Seattle, Wash., has elected the following officers: James Nichols, president; J. H. MacDearmid, vice-president; D. de Remer, second vice-president; O. R. Graver, Charles Holman and Harry Jones, board of directors. The stockholders appointed A. Scott to the position of treasurer and R. L. Prentice to serve as secretary.

Would Increase Fees—Plans are under way to introduce a bill to the New Hampshire legislature next year to increase the fees for registering motor cars. It is proposed to have the fees somewhat similar to those of Massachusetts. However, the motorists are going to fight the issue determinedly when it comes up, and with clubs being organized throughout the state it is believed that the bill may be defeated. The hotel men who reap a harvest from motorists will object to the bill, and they are very strong in New Hampshire.

Making Run to Coast—Starting from City Hall Square, New York, on Monday, a party of four in an Ohio car commenced a long journey to San Francisco, covering approximately 5,000 miles of the least frequented roads of the southern and southwestern states. The trip will take 35 days at an average of 150 miles a day, the intention being to reach the Golden Gate city on Christmas day. The motorists will convey a Christmas greeting from Mayor Gaynor, of New York, to Mayor McCarthy. Two objects have prompted the Ohio Motor Car Co. to undertake the trip—a thorough investigation of road conditions in the regions traversed and an actual demonstration of the cost of maintaining a car on a coast-to-coast run. The road data collected will be compiled by an expert and furnished free to motorists, good roads associations and others interested in the improvement of the national highways. The party consists of Ernest L. Ferguson, representing the American Automobile Association, as official observer; Guy W. Finney, representing the Ohio Motor Car Co.; Harry Mathews, driver of the official starter's car in the recent Munsey historic tour, and a mechanician. The route will be south through New Jersey, Pennsylvania, Maryland, Virginia, North and South Carolina, Georgia, Florida, thence north into Alabama, Tennessee and Kentucky, and west acrosss the Mississippi river into Missouri and Kansas, when the course will again be directed south into Oklahoma and Texas. Reaching the Rio Grande, the route will follow a northwesterly course over the arid plains of Texas, New Mexico and Arizona into California, with the windup in San Francisco.

Touring Information Free—"All information cheerfully and gladly given. No gratuities." This is a sign, printed on neat pasteboard, which has stared visitors to the Automobile Club of Syracuse, N. Y., in the face ever since the organization opened its business rooms, which are visited by so many tourists in the course of a season. The sign has now been permanently embodied in blue enameled lettering against a white background of sheet steel, hanging upon the wall of the new quarters.

Dover Starts a Club—The motorists of New Hampshire are rapidly getting together enough clubs to form a state federation, and now Dover has been added to the cities in that state that have clubs, one being formed Wednesday night. Officers were elected as follows: President, F. B. Williams; vice-president, W. Finley; secretary and treasurer, L. W. Flaners; directors, D. Furber, W. H. Roberts. Charles C. Goss and George H. Williams. A. G. Whittemore was elected delegate to state and national meetings.

Novel Organization—The Chauffeurs', Automobile Drivers' and Automobile Workers' Association of Syracuse, N. Y., is just formed, not as a trade union, it is stated, but for mutual benefits. A principal object is the watching of legislation, and an effort is afoot to have the workers in other cities of the state form similar organizations. When this is done efforts will be made to try and secure a reduction of the annual $5 fee for registration, which the drivers think excessive. The Callan bill sets this fee, which is higher than that of other states. The Syracuse organization is incorporated at Albany, the directors being Robert W. Masters, John C. Greaves and Christopher Murphy.

Harroun Has Retired—Ray Harroun, the Marmon racing driver, has retired from the sport and will devote his time to building gasoline aeroplane motors and aeroplanes.

Connecticut's Income—Some idea of the increase of the number of cars in the state of Connecticut during the past year is evident from the fact that for the fiscal year the income from license fees has been $162,000.

Means Much to Motorists—Pittsburg motorists are gratified by the passage of the $10,300,000 bond issue. This means immense improvements to both old Pittsburg and old Allegheny, which now is a part of Greater Pittsburg, prominent among which are the raising of all the streets in the flood district, making them passable for motorists at all seasons of the year, providing a wide motoring thoroughfare direct from the downtown district to the east end and freeing the Allegheny river bridges which now exact a heavy toll from motor car drivers.

Brush Cuts Wood—A practical demonstration of the utility of a motor car in performing work where power is required but not otherwise available was recently made by the Oregon Brush Co., of Portland, Ore., whose manager, William Wilzinski, used a Brush runabout to saw the winter's supply of hardwood for the Lincoln high school in Portland. Wilzinski attached a belt pulley to the left rear wheel and jacked up the car. Placing a belt around the pulley of a circular wood saw, he started the motor and with the aid of his head mechanic, H. A. Black, quickly disposed of the pile of cord wood.

BRUSH USED BY OREGON MAN TO SAW WOOD

Four Winds

Wilzinski sat in the car and regulated the speed while Black manipulated the sticks of lumber.

Remember the Sick—An ordinance is pending in the city council of Columbus, O., to compel all motorists to go no faster than a walk in front of a hospital, and also to sound no horns while passing. The ordinance is now in the hands of the judiciary committee which probably will recommend it for passage soon. Motorists believe that it will be unconstitutional, as it violates the Ohio state motor law.

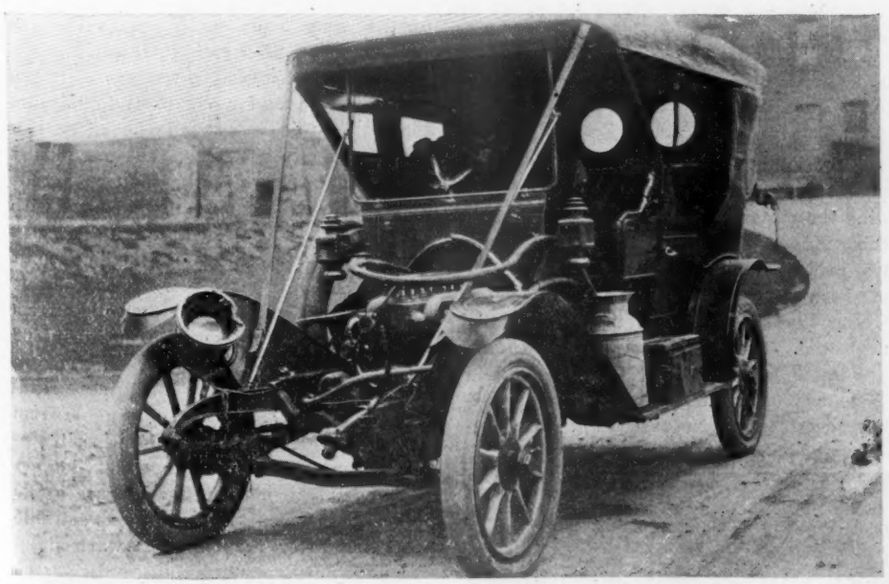
Federation After Members—The Pennsylvania Motor Federation, in which prominent members of the Pittsburg Automobile Club are taking an active interest this year, is doing good work in the way of organizing to get better roads. It is making every possible effort at present to learn every point in the state where there is no motor club existing and to get individual owners there to organize. Dozens of clubs have been formed since the close of the summer season and now are lining up with the federation to help secure some more favorable road and general motor legislation at Harrisburg this winter.

Threshers Will Help—Motorists of Indiana promise to have a powerful ally in the good roads movement in the future in the newly-organized Indiana Brotherhood of Threshermen, which was organized at a convention held in Indianapolis November 15 and 16. Some 600 farmers, owners of threshing machines, belong to the association. Primarily the organization is interested in obtaining equal rights on highways for threshing machinery and to obtain legislation making a thresher's lien possible. But the association is also going to take an active part in efforts to obtain a state highway commission, convict labor on highway construction and a graduated tax on vehicles and motor cars.

Bulldog in New England—Having covered 17,000 miles of its proposed 100,000-mile durability run, the Abbott-Detroit Bulldog is now in New England and spent Thanksgiving day in Portland, Me. From that city the run to Florida will be made.

Chooses Directors—The Mercer County Automobile Club, which starts out with a membership of 120 elected the following directors in a recent meeting in Sharon, Pa.: William McIntyre, H. B. McDowell, George Short, David Christie and Horace W. Davis, of Sharon; Dr. A. E. Cattron and Leon Robbins, of Sharpesville, Pa.; Q. C. Burnett, of Greeneville, Pa.; Benjamin Spearman and John Carruthers, of Grove City, Pa., and Frank McGill, of South Sharon, Pa. The club will work hard for better roads.

Milk Can For Radiator—J. Fred Brown, of Martelle, Ia., recently made a clever substitution of a milk can for a radiator on his Velie. His car was struck by a Milwaukee switch engine as Brown was driving across the tracks in his home town after a long freight train had passed. The radiator was torn completely away, both lamps were destroyed and the hood was so badly wrecked that it was discarded. Careful examination revealed that the motor had not been damaged. The motor would run, but there was no place to store water for cooling purposes. Brown secured a large milk can, and after filling it with water placed it on the right step, wiring it securely. With the aid of two pieces of garden hose he completed his invention. One piece of hose was attached to the intake pipe and run to the milk can, and the other one was fastened to the exhaust and extended to the milk can. After packing his suit case he set out for Moline, Ill., and arrived without further mishap.



Iowan Uses Milk Can for a Radiator

Organizing Country Club—Motorists at Fond du Lac, Wis., are planning to organize a county motor club, to become affiliated with the Wisconsin State A. A. and through this the A. A. A.

Robert Drach Dead—Robert Drach, who achieved fame as a racing driver and followed it up by becoming a well-known salesman, died in Chicago last Monday of typhoid pneumonia. Mr. Drach had represented the American and Amplex in Chicago and drove a Lexington in the Elgin road races. He won two 24-hour track races in Milwaukee in a Locomobile.

Fortesque Busy—Secretary James Fortesque, of the Massachusetts State A. A., in his work of forming motor clubs in New Hampshire succeeded in getting the Portsmouth Automobile Association under way last Friday night with twenty-five motorists on the membership roll. The officers elected are: President, Dr. F. S. Towle; vice-president, Charles A. Hazlett; secretary and treasurer, Horace P. Montgomery; directors, Dr. F. S. Towle, J. S. Whittaker, Dr. S. T. Ladd and Dr. W. D. Walker.

Regal Passes 30,000-Mile Mark—The Regal Motor Car Co.'s Plugger continues to forge ahead on the all-southern tour. Latest reports are to the effect that the roads in most every section are very rough and muddy. The Plugger left Norfolk, Va., on September 15. It has traveled across the south, visiting all the principal cities to the border line of Texas. The return trip is now being made. On its arrival at New Iberia, La., the total mileage that the Plugger has covered in all of its tours reached the 30,000-mile mark.

Through Signboarding This Year—The sign work of the Automobile Club of Syracuse is now practically completed for the season of 1910. More than 700 signs have been erected during the year in Onondaga, Jefferson, Oswego, Oneida and Madison counties, for the club has gone far afield in the prosecution of this helpful service. There is now talk that a club may be formed in Watertown, and if this is done the northern city organization will take up the sign matter in earnest and spread them through that section.

Means Good Roads—The Milwaukee county board of supervisors has made provision for $100,000 for highway improvement in Milwaukee county in the budget for 1911. This is the first definite step for a comprehensive system of parked highways in Milwaukee county, as outlined by the metropolitan park commission, working for the city and county. Within the city much progress has been made. A number of experts will be engaged to have charge of the work. The $100,000 appropriation gives the county $140,000 for highway work, there being $40,000 in the fund.

The Motor Car Repair Shop

Hints for the Amateur

THERE is a prevailing idea in the minds of many motorists that in a motor with a circulating oiling system, in which the lubricant is used over and over again, that as long as the proper level is maintained in the crankcase the motor is being properly lubricated. It even is claimed by the selling representatives of some motor car manufacturing companies, that owing to the construction of the motors in the cars which they sell, leakage of oil from the crankshaft ends is entirely eliminated and their cars can run several thousand miles without the necessity of replenishing the oil supply in the crankcase. It is true there are motors in cars which under favorable conditions can run a couple of thousand, or perhaps even several thousand miles, without reducing the level in the crankcase to any considerable extent, and a slight replenishment would permit of a couple of thousand more miles of travel; but the bearings of the motor must by this time be in sore need of repair and adjustment.

It is not only necessary that the proper supply be maintained in the oil reservoir of a motor, but it is even more important that the proper lubricating constituency of the oil be sustained and not impaired by the accumulation of solid particles of carbon. It is a well known fact that after the oil that is used in a circulating oiling system has been on the job, so to speak, for a reasonable length of time it begins to lose its clear aspect and take on a murky dark color which, if ignored, in time becomes black. And if when this black oil is drained from the case, one were to allow some of it to run onto the fore-finger it would be very thin and not very oily; and should it be rubbed between the finger and the thumb it would be found to contain a powdery gritty substance decidedly not good for bearings.

The requirements of a suitable lubricant for circulating oiling systems are that it be of a proper consistency to feed well with the lubricating arrangements and under the temperature conditions required; of such viscosity and oiliness as to reduce friction to a minimum, and contain a minimum amount of constituents prejudicial to its sustained effect. From the above statements it may be seen that when an oil has been used for too long a time it will have lost in one of its most essential requirements, its viscosity, and taken on an excessive amount of what is referred to as a prejudicial constituent, granular carbon. The viscosity of an oil is its disposition to be creamy; it is a name applied to the internal friction between the globules which restricts its fluidity, and when it is stated that an oil has lost its viscosity, one is to infer that it has lost its original creamy composition and become more like skim milk. The fat or grease globules in an oil are the elements that keep the lubricated surfaces sufficiently apart to prevent rubbing; and when these oily elements are burnt in the cylinders of a motor a fine carbon deposit is formed. Thus, when all or most of the oily contents of a lubricant are carbonized, it ceases to be an effective lubricant and becomes more of an abrasive.

In order that a motor may be properly lubricated the entire crankcase supply should be drained out and replaced with fresh oil about once a month, or more frequently, if the car is doing continuous and heavy duty, as when running under very muddy conditions, or on the lower gears on rough or hilly roads for any length of time. It also is advisable, after the oil has been left in the crankcase for an unusually long time, to flush the crankcase out with kerosene to remove the sediment.

Keep the Brakes Adjusted

It might be a very good thing for every driver of a motor car to seek an opportunity now and then of riding in the front seat of another car beside some other driver. It would, perhaps, make him a trifle more thoughtful of the uneasiness caused his own passengers when driving his own car. At any rate he would not be a passenger for long before he would be noting the efficiency of the brakes and the ability of the driver to operate them; and it is quite possible that if they did not seem to respond as readily as they should he would be trying to push the foot-board out of the car in an effort to assist in bringing the car to a stop.

Knowing the importance of always keeping the brakes of a car in the most perfect working order, the expert driver would no more think of driving his car with the brakes out of adjustment or in poor working order, than he would of running the motor without oil. Still there are thousands of drivers throughout the country priding themselves upon their ability of keeping a car in first-class condition whose brakes really are most criminally neglected. There are many drivers who do not know how to adjust the brakes, and there are others who know how the adjustments should be obtained but when putting their knowledge to the test find that their efforts are not greeted with success. To such drivers Motor Age will gladly give through the columns of the Readers Clearing House thorough instruction and all necessary illustrations relative to the adjustment of the brakes of any make of car now being manufactured.

About Starting a Cold Motor

Starting a motor after it has been standing out in the cold for a few hours, or in a cold garage over night, is no joke; and a few hints on how to start with the least amount of cranking will no doubt be appreciated by many. Perhaps the best way to get a motor started is to wrap a bunch of waste loosely in a cloth, saturate it with gasoline, put a half-teaspoonful of gasoline in each cylinder, turn on the ignition and crank the motor. As soon as it starts, run around and carefully place the saturated waste and cloth near the air intake of the carbureter so that as the motor begins to slow down it may be brought still closer and a combustible mixture be thus formed until the carbureter begins to carburet. Should this fail, simply remember the old adage, "If at first you don't succeed, try, try again," and when the motor has become sufficiently warm it will keep on running without the necessity of holding the saturated waste and cloth near the air-intake of the carbureter.

It is recommended that if the intake manifold of the motor be tapped just above the carbureter, and connection be made with the acetylene gas tank, a cold motor can be readily started and run on acetylene gas until the carbureter begins to deliver a suitable mixture. Another way is to have a long piece of rubber hose which can be attached at one end to one of the lamp leads, or direct to the gas tank, and the other end stuck into the air-inlet of the carbureter; the gas can then be turned on and a combustible mixture formed in this way until the carbureter is brought into use. It is not universally known that there is more than one grade of gasoline on the market, and that with the better grades a motor can be much more readily started than when a poorer grade of fuel is employed. It is possible by special order to obtain gasoline from the oil manufacturers that tests about 68 degrees Beaume at 60 degrees Fahrenheit, and which vaporizes very much more readily than the fuel generally obtainable from the garage or tank wagon. The fuel generally supplied tests around 62 degrees Beaume at the normal temperature of 60 degrees Fahrenheit, and is just as suitable as a fuel after the motor is warmed up and under ordinary running conditions as the more volatile and expensive gasoline.

Current Motor Car Patents

BALL-BEARING Crankshaft Design—No. 974,697, dated November 1; to Emil Nelson, Detroit, Mich.—This patent covers a crankshaft design permitting the use of annular ball bearings as a means of support. As shown in Fig. 1 the crankshaft comprises two sections, S and S1 having adjacent cranks with abutting bosses B and B1 on the cranks concentric with the axis of the shaft. A pin P projecting from the boss B1 passes through a corresponding aperture in the boss B and a clamping nut N has a threaded engagement with the end of this pin to bind the two crankshaft sections together. For the purpose of maintaining proper alignment of the crankshaft sections and overcoming torsional strains, Woodruff keys such as indicated at K, are placed at intervals around the periphery of the bosses. The inner ring of the ball bearing serves to retain these keys in their seats.

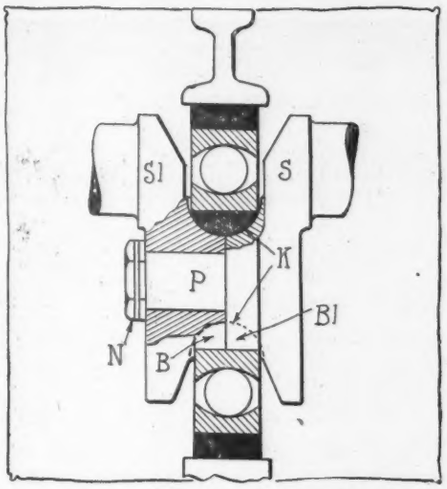


FIG. 1—BALL-BEARING CRANKSHAFT

Multiple-Feed Gear-Pump—No. 974,783, dated Nov. 8; to Walter A. Frederick, Muskegon, Mich.—The multiple-feed gear-pump to which this patent applies is very simple in construction, as may be seen from the illustration Fig. 2; and it differs only from the gear-pumps now commonly used on motor cars, in that it has a series of four spur gears so arranged that three leads may be employed. The gear G is the one driven from the motor, and it drives all the other gears in the pump, directly or indirectly. The arrows on the gears indicate the direction in which they rotate. When employed for pumping oil, the oil enters the casing containing the gears at the inlet ports I, and is then carried around between the teeth of the gears, making its exit into the leads at E, through which it may be conducted to different places.

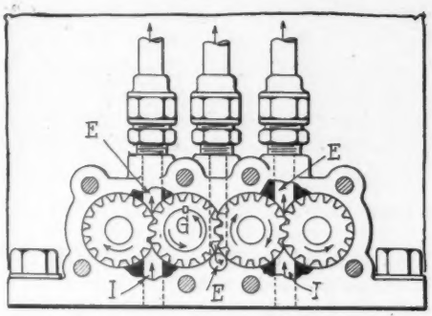


FIG. 2—MULTIPLE FEED GEAR PUMP

Another Slide-Valve Engine—No. 974,809, dated Nov. 8; to Hans Clarin Hovind Mustad, Duclair, France—In this engine there is but one split sleeve, or rather two oppositely positioned semi-cylindrical slides which move independently of each other. As illustrated in Fig. 3, the inlet and exhaust ports I and X are both closed; the piston is at the head end of its compression stroke and ready to descend on the explosion stroke. On the exhaust stroke of the piston the cam C would communicate with the roller on the end of the bell-crank B, drawing the slide S down so as to uncover the exhaust port X. On the intake stroke of the piston, the slide opposite slide S would be operated in a similar manner and the inlet port opened. The dotted line D marks the occlusal edges of the slides.

Steerable Driving Wheels—No. 974,773, dated Nov. 8; to Charles C. Bettenhausen, Princeton, Neb.—This patent relates to an arrangement of bevel gears in combination with steering pivots, at the extremities of driving axles for shaft-driven cars. It is a design which makes possible a four-wheel drive and four-wheel steering as well. As illustrated in Fig. 4, it consists of an encased rotary axle of the bevel-gear differential type, having knuckles at the outer ends of the axle-casing and bevel-gear driving connections between the stub-shafts of the wheels and the drivingshafts of the axle. There is a small bevel pinion gear G on the outer end of each axleshaft which meshes with a similar gear G1. The gear G1 is attached to a vertical sleeve having another gear G2 at its upper end, and this gear is in mesh with a pinion G3 secured to the stubshaft of the wheels. Suitable casings are provided so that the gears at the axle extremities are not exposed to mud and dust of the road.

Self-Lubricating Engine-Cylinders—No. 974,854, dated Nov. 8; to Henry H. Boggs, Detroit, Mich.—This patent covers, as an article of manufacture, an engine cylinder of cast metal whose inner wall is provided with cone-shaped inserts I of refractory lubricating material, arranged as illustrated in Fig. 5. The inserts are disposed with their smaller end faces flush with the inner wall of the cylinder, and are secured in place in the process of casting the cylinder blank.

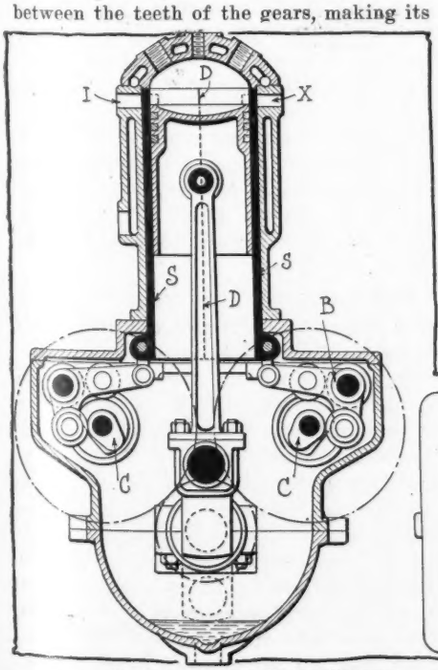


FIG. 3—A SLIDE-VALVE ENGINE

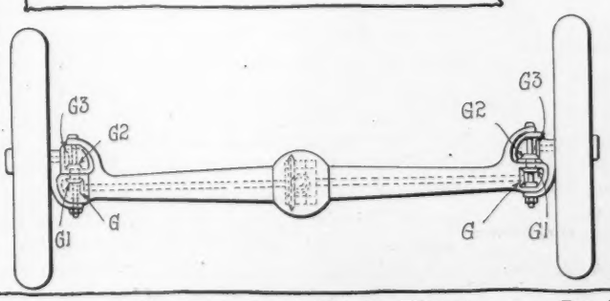


FIG. 4—STEERABLE DRIVING WHEELS

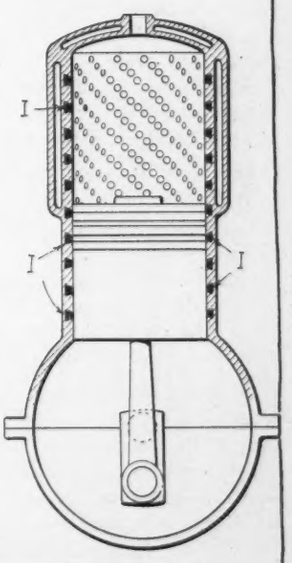
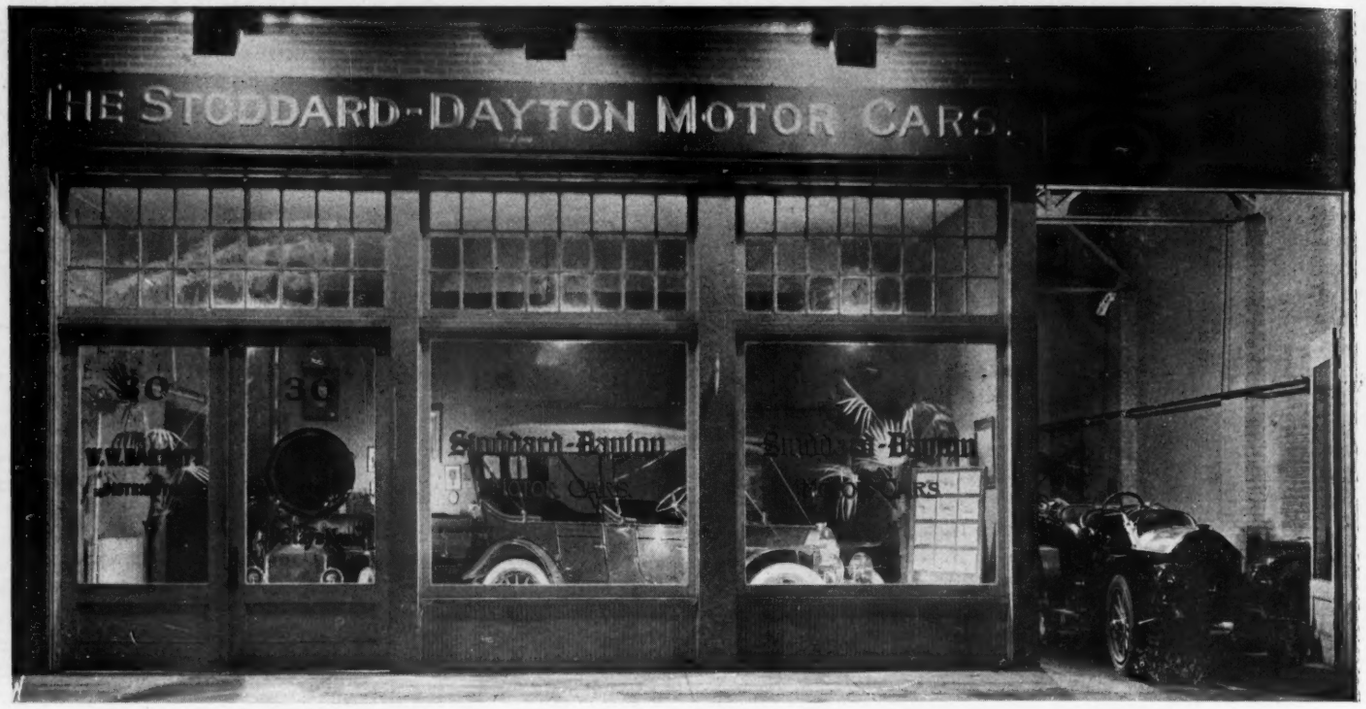


FIG. 5—SELF-LUBRICATING CYLINDER

Among the Makers and Dealers



NIGHT VIEW OF THE DENVER STORE OF W. W. BARNETT, STODDARD-DAYTON'S COLORADO REPRESENTATIVE

GLIDE Extension—The Bartholomew Co., of Peoria, Ill., is rushing the work on two extensive additions to its factory at Peoria Heights.

Gordon Joins Timken—C. E. Gordon, formerly vice-president of the Western Malleable Iron Co., has joined the sales staff of the Timken Detroit Axle Co. Gordon will represent the company on the road.

Rumor Heinze May Move—There is a rumor in Lowell, Mass., to the effect that the Heinze Electric Co. may move to Detroit. An effort will be made by local business men to keep the plant in Lowell. Congressman Butler Ames is one of the big stockholders in the company.

Peoria Will Hold Show—Peoria will hold a show in its Coliseum, December 1, 2 and 3, the display being under the patronage of the dealers of the city. The outcome of the show will be the formation of a club in Peoria. The profits of the show will go to the organization of the club and the fitting up of quarters.

Buys the Gaeth Plant—The Stuyvesant Motor Car Co. has purchased the assets of the Gaeth Automobile Co., of Cleveland, which recently went into the hands of a receiver. The Stuyvesant company is building a six-cylinder car called the Stuyvesant, and has a large factory at Sandusky covering 150,000 square feet of floor space. The Gaeth plant will be removed to Sandusky and the company will continue to build the Gaeth model. It is the intention to build 200 four-cylinder Gaeths and 100 Stuyvesant six models for 1911. The board of directors of the Stuyvesant company are: F. E. Stuyvesant, A. H. Frunfelder, A. C. Newton and C. J. Castle.

Pennsylvania Situation—At a joint meeting of the stockholders of the Pennsylvania Auto-Motor Co., of Bryn Mawr, Pa., and the creditors' committee appointed by the creditors' meeting held October 29, 1910, the following plan was agreed upon: The stockholders agree to loan to the company sufficient funds so that immediately upon the unanimous acceptance of the plan by creditors having accounts of $100 and over it will pay to its creditors 25 per cent of the face of their approved claims as of October 31, 1910. The balance to be paid in three equal installments on July 1, August 1 and September 1, 1911, for which the company's notes, with interest at 6 per cent from October 1, 1910, are to be issued. They further agree to supply sufficient funds to carry the pay rolls and obtain the additional parts required to work up present raw materials into finished cars until the selling season opens in the spring, and guarantee that the bonds and underlying mortgages will not be foreclosed while the agreement in in force. The statement of the company shows assets of $315,307.05 and liabilities of $194,407.17. The creditors' committee consists of F. W. Spacke, F. W. Spacke Machine Co.; William McClellan, Francis Camac Co.; N. E. Parish, Parish Mfg. Co.; Edward K. Rowland, William & Harvey Rowland; E. S. Fretz, Light Mfg. and Foundry Co.

Fisk Improving Plant—The Fisk Rubber Co., of Chicopee Falls, Mass., again has found it necessary to add to its plant. The new addition is of steel and brick, 187 feet long by 36 feet wide, four stories high. A new engine room also is being constructed and the boiler house is being enlarged. The entire new work will add about 42,000 square feet of floor space to the plant, 75 per cent more boiler capacity, and increase the machine shop capacity about 30 per cent. A new 1,200-horsepower engine is to be added and 300 horsepower additional electric equipment will be installed.

Ford Branch in Fargo—Fargo, N. D., has been selected as the twenty-fifth branch house for the Ford Motor Co. The territory which will be covered by this latest addition will comprise North and South Dakota and will be in charge of C. F. Reynolds, formerly with the Ford branch at Chicago. It is the intention of the company to have built in Fargo a large warehouse, so that this northwestern trade can be looked after. It is the company's intention to carry a large stock of Ford parts, including a complete line for all Ford models of cars, at Fargo. The company will for the present locate temporary Fargo offices with the Frank Lynch

Co., at 17 Broadway, and will conduct its business there until the territory has been thoroughly canvassed, dealers signed up, and actual business gotten well under way.

Eisele With Stromberg—F. W. Eisele, who has been acting as a special factory representative for the Stromberg carbureter during the last year, has been appointed Ohio and Indiana manager and will open up branch offices at Indianapolis in the near future. In the meantime he is making his headquarters at 2006 North New Jersey street, Indianapolis.

Independent Show Proposed—A movement is on hand to have an independent show in Pittsburg next spring. The Associated Automobile Dealers of Pittsburg is the name of the organization which was formed at the meeting a few days ago to promote the show. Its officers are: J. Joe Feicht, of the Liberty Automobile Co., president; Edward Bald, of the Bald Motor Car Co., vice-president; James Kerr, of the Kline-Kerr Motor Co., secretary; J. B. Howe, of the Pittsburg Automobile Co., treasurer. Thirty-four members were enrolled and the building has already been secured for the show.

Will Make the Coggswell—A Grand Rapids car, designed by a Grand Rapids man, assembled by Grand Rapids workmen and carrying a Grand Rapids name will be manufactured by a company composed exclusively of Grand Rapids men. The inventor is H. Coggswell and the machine is the Coggswell 35. The corporation is the Coggswell Motor Car Co., doing business at 25 North Front street. The engine is four-cylinder, the cylinders being cast in pairs, with 4-inch bore and a 4½-inch stroke. At the outset about seventy-five men will be employed. At present the car will merely be assembled in Grand Rapids, the construction of the parts to be let to outside firms. It is planned to begin active work on January 1. The new company, which now is in the process of formation, is to be capitalized at $250,000. The identity of those interested is being withheld at the present time for business reasons.

New Packard Service Building—The Packard Motor Car Co. of New York has opened its new eight-story service building at Long Island City. It is on Thompson avenue, south of the extensive terminal improvements of the Pennsylvania and Long Island railroad system, conveniently located to the New York quarters, being only 2½ miles via the Queensboro bridge and across the viaduct spanning the railroad yards. The appearance at a distance is of a building almost entirely of glass—in fact, three sides of the structure are thus enclosed, special metal frames for the work having been imported from England. The building has eight stories and a basement, providing approximately 129,000 square feet of space. In the basement of the building, 150 by 96 feet, the power plant is located. On the main floor are the general offices, retiring rooms, etc., with space for cars awaiting delivery and for sales purposes. A mezzanine floor provides added space for office and clerical work. The stock room, a most important feature, occupies the entire second floor. The entire third floor is at present used for storing cars and bodies. The fourth and fifth floors are devoted to the painting and upholstering departments. The mechanical, overhauling and repair work is done on the sixth and seventh floors. The forge shop is separated by partitions of concrete and wire glass. Next to the forge shop is the tool room, with netting partition. The eighth floors, with a clearance of 15 feet, is devoted exclusively to the truck department. The high clearance allows the easy storing and moving about of vehicles with the largest bodies.

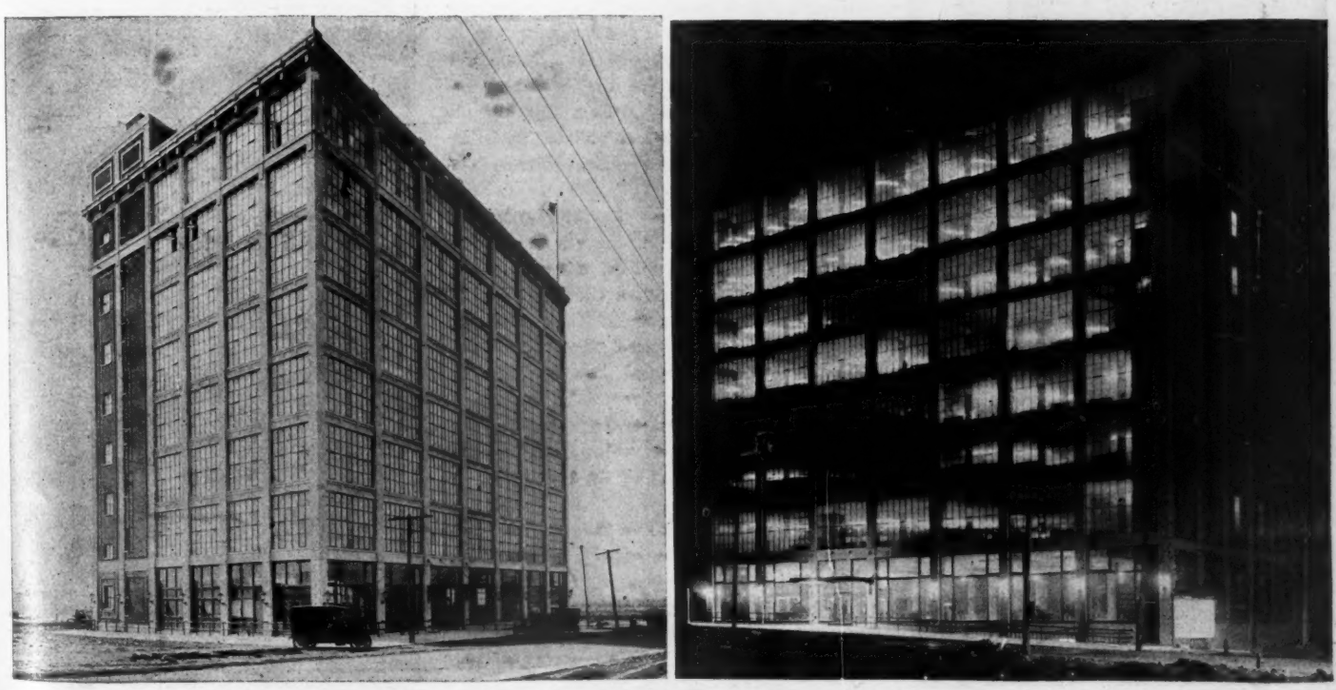
Made in Thompsonville—The Maximobile described in a recent issue of Motor Age is made in Thompsonville, Conn., not Hartford, as captioned under an illustration.

Moline Man Goes Abroad—Eugene Grenwauld, superintendent of the Moline Automobile Co.'s factory, has left to attend the Paris show, with the object of making a study of long-stroke motors.

Working 10 Hours Daily—The entire force of the Mitchell-Lewis Motor Co., of Racine, Wis., has been placed on a 10-hour workday schedule. For some time the plant has been running 8 hours a day, but the increase in the demand has forced the company to lengthen the workday and add more workmen.

In Receiver's Hands—The Standard Automobile Supply Co. of Chicago was thrown into a receiver's hands last Saturday, caused, it is said, by the fact that the principal stockholder had failed in another line of business. The Chicago Title and Trust Co., the receiver, has retained L. L. Halle as manager, and it is expected the company will weather the storm.

Seattle Show Outlook—While no definite date has been set, Seattle dealers are seriously considering holding a show in that city some time during the next 2 months. The industry in Seattle, according to the statistics of well-known and old-established motor companies in that city, is rapidly growing each year. Agents, distributers and even factory representatives from other large cities from the east and middle west are locating there, as they consider it an excellent field for their business.



NEW PACKARD SERVICE BUILDING RECENTLY COMPLETED IN LONG ISLAND CITY

ELECTRICAL IDEAS FOR USE OF MOTORISTS

REMY KICK SWITCHES

THE Remy Electric Co., Anderson, Ind., has announced a series of kick switches for use in conjunction with its 1911 magneto apparatus. One characteristic of all of these switches is the ease with which they may be installed. None of them has any solder connections to make, all the wires being cabled and each wire having a terminal clip. Each of the two cables of the dash kick switches is plainly marked. The wires composing the cables are in color and are to be connected to binding posts of corresponding color. The cables are equipped with a brass diverging device, which holds each wire at the proper angle for connecting.

These Remy kick switches are in three types: Type A switch, Fig. 1, is made either for a hand key or kick pedal. This switch is mounted upon a polished coil box. This coil box is practically the same as was used with their 1910 apparatus. Type B switch, Fig. 2, is made with either a hand key or a kick pedal. This switch is designed for small and already crowded dashes, or where the dash is to be plain or unencumbered. Both types A and B are of metal, finished in black and brass. The hand key is hard rubber and of the conventional shape. The kick pedal is brass; the upper part has a sand blast finish and the lower part polished. Type C, Fig. 3, is made up as a kick switch only, and when installed is almost flush with the dash, as

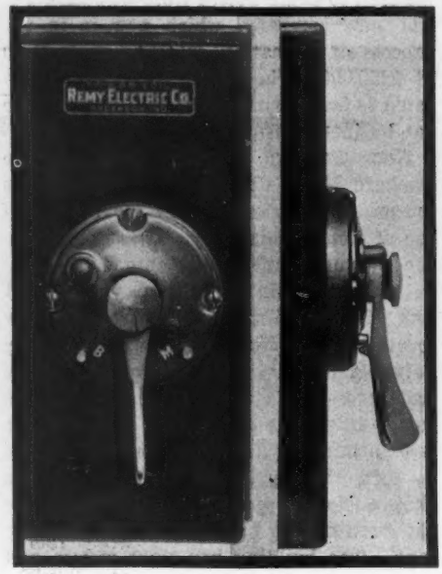


FIG. 1—REMY TYPE A KICK SWITCH

can be noted from the illustration. This switch is of brass throughout, and has a sand blast and polished finish. All three types are equipped with a hard rubber push button for starting the motor on the spark without cranking when batteries are wired in connection. These kick switches are all provided with detachable key, which can be carried in the operator's pocket. The removal of this key makes the switch inoperative and provides against theft of the car.

HARTMAN LIGHTING SYSTEM

The Hartman Electrical Manufacturing Company, Mansfield, O., is building and marketing an electrical outfit which furnishes current for lighting a car as well as that needed for ignition and operating the electric horn. The Hartman system comprises a 6-volt generator, Fig. 5, weighing but 24 pounds, and a regulator box, Fig. 4, which is intended to be mounted on the dash, and which contains the regulating devices, switches, fuses, sockets for trouble lamp, and also a socket to connect with the battery, which can be charged from the dynamo.

The operation of the generator is claimed to be automatic. With the car stationary or traveling slower than 10 miles an hour, the current is taken from the battery, but when the car speed exceeds this mark the generator carries the load direct and surplus current not needed for ignition or lighting goes to the battery. It is claimed to be impossible to overcharge the battery because the generator voltage is always slightly lower than that of the battery when at full charge.

The regulating device on this electric outfit is said to keep the voltage constant at the lamps, tests having shown the variation to be less than ¼ volt at the generator with speeds ranging from 1,200 to 6,000 crankshaft revolutions per minute. Switches are provided in the regulator box for the head, dash and taillights, and the turndown feature is fitted in connection with the headlight switch, by means of which the light of these lamps can be cut one-third the ordinary brilliancy. All circuits are fused so that a break-down on one will not affect the other. Extra fuses are provided. A separate circuit is furnished for the motor ignition. As shown in the lower right-hand corner of the regulator box, Fix. 2, sockets are furnished for the trouble lamp.

G. E. RUNABOUT RECTIFIER

The trade in general is familiar with the universal battery charging rectifier outfit which has been manufactured for years by the General Electric Co. This outfit complete with voltmeter, ammeter and protective devices, is suitable for a wide range of voltage and for current capacities varying from 10 to 50 amperes. To meet the demand for a less elaborate outfit the company recently has put on the market what it designates its runabout type. This runabout type is made up without voltmeter or ammeter, and is recommended only for use on electric vehicles which are fitted with voltmeter and ammeter. It is designed to charge batteries with from twenty to thirty-two cells, and at a maximum charging rate of 30 amperes. Because of its simplicity it does not require special means for adjusting current and voltages. It has but one small dial switch, which gives a fine range of regulation claimed to be sufficient for a battery of twenty to thirty-two cells.

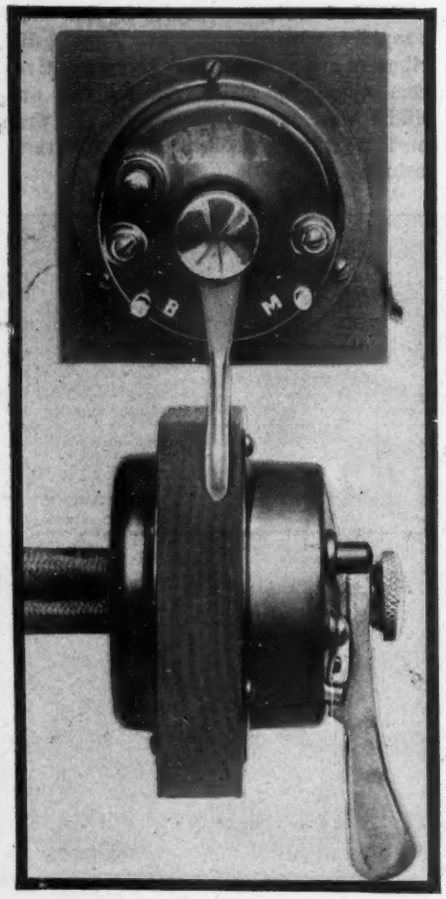


FIG. 2—REMY TYPE B KICK SWITCH

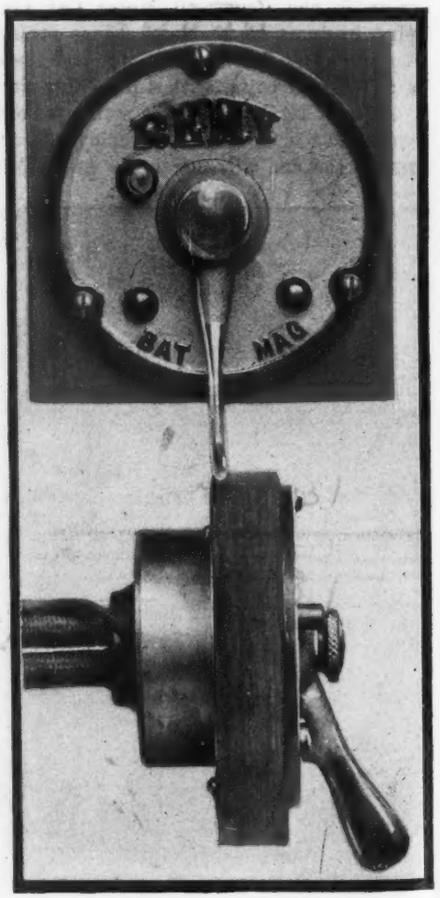


FIG. 3—REMY TYPE C KICK SWITCH

KICK SWITCH, LIGHTING SYSTEM, RECTIFIER

FIG. 4—HARTMAN REGULATOR BOX FOR THE DASH

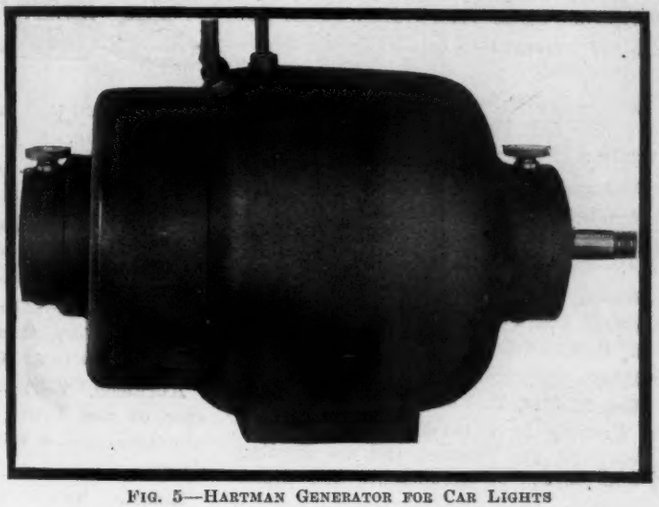


FIG. 5—HARTMAN GENERATOR FOR CAR LIGHTS

Fig. 1 shows the front view of the runabout rectifier. The panel part is selfsupporting, being carried on two vertical pipes which are screwed into receptacles on the compensating resistance part. The outfit consists of four essential parts, namely, the rectifier tube, the compensating resistance, the regulating resistance, and the panel for this support. As shown in Fig. 2, a rear view of the device, the rectifier tube is an exhausted glass vessel containing mercury and having four electrical contacts, two being the working anodes, one the cathodes, and the other the starting anode.

The tube is mounted in a holder located on the back of the panel. The shaft of the holder extends through the panel and is connected to a hand wheel on the front, by means of which the tube is tilted when starting the outfit. The function of the compensating reactance is to maintain the arc in the tube while the alternating current is passing through the zero point of the cycle. This reaction is so arranged that one lead is a negative pole of the rectified current while the other leads are arranged so that the reactance can be used as a compensator—thus its name, compensating reactance—so that by a few changes the oufit can be used on either 110 volts or 220 volts alternating current supply circuits and be able to charge a maximum of thirty-two cells.

Regulation of the direct-current voltage is accomplished by means of a regulating reactance which is connected in the alternating current line. This reactance consists of a coil wound upon one leg of a rectangular laminated core. The coil has eleven taps, which are connected to studs on a dial switch mounted on the front of the rectifier panel.

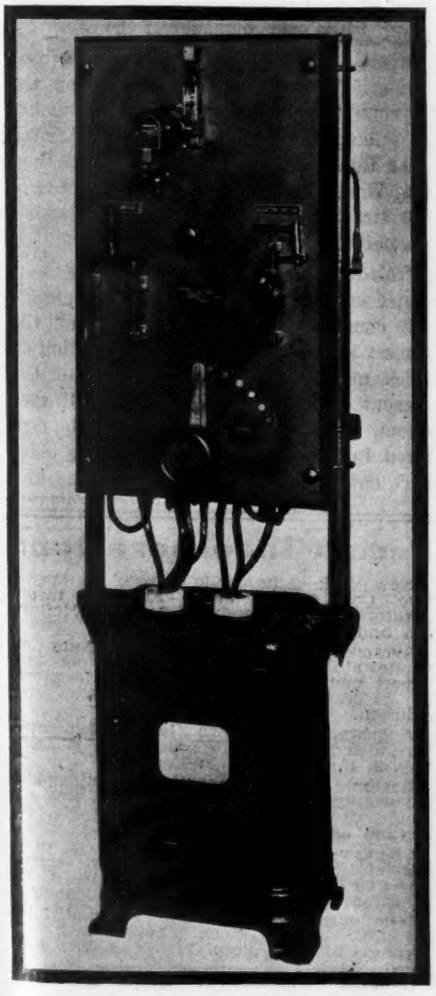
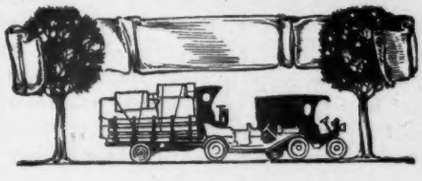


FIG. 6—G. E. RUNABOUT RECTIFIER

MAKES TUBE DEFLATOR

The Wald Co. of Sheboygan, Wis., manufacturer of motor car accessories, has added two new patented articles to its line—the Wald pedal rubber and the Wald tube deflator. The deflator is designed for the tire repair man and facilitates letting the air out of tires, also protecting the valve spring and pin. The pedal rubber is made of cold rolled steel, 1-32 inch thick and covered with 3-16 inch of rubber. It is attached to the pedals and saves shoes and prevents slipping. The production of the Wald Co. for 1910 will reach 85,000 pieces of various types of accessories. New equipment, including a large stamping press, has been installed.



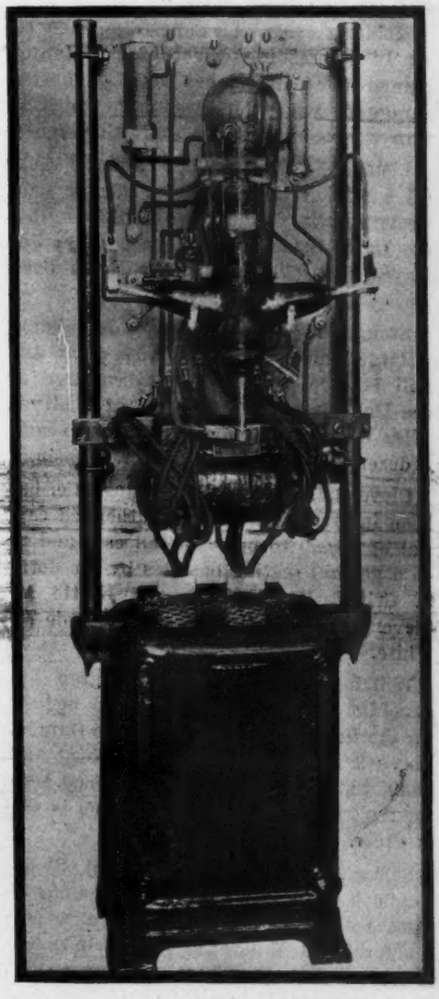


FIG. 7—G. E. RUNABOUT RECTIFIER

Brief Business

RUSSELL, IA.—A garage has been opened here by C. M. Phinney.

Lansing, Mich.—The Warren Motor Car Co. has increased its capital from $100,000 to $300,000.

Madison, Neb.—The Madison Motor Co. is a new firm just starting in business in Madison.

Columbus, Neb.—Joseph E. Dischner, of Columbus, Neb., recently became agent for Cadillac cars for Colfax and Platte counties.

Omro, Wis.—R. F. Pratt has been appointed district agent for the Ford by the Hickman-Lauson-Diener Co. of Milwaukee, state distributor.

Des Moines, Ia.—S. B. Johnson and E. J. Hewling have taken the Des Moines agency for the Packard and are erecting a new garage at Seventeenth and Grand avenue.

Sioux Falls, S. D.—The E-M-F Sioux Falls Co. has been incorporated. A new building in course of construction, 44 by 100 feet, two floors and basement, has been leased.

Minneapolis, Minn.—W. A. Albough, factory representative for the Selden Motor Vehicle Co., of Rochester, N. Y., is in Minneapolis. He is seeking a representative for this make in the northwest.

Holdrege, Neb.—C. Sangstrom, who recently became the owner of the Hanson garage at Holdrege, has now bought the garage of Oscar M. Swedburg, which in turn was acquired but a short time ago.

Council Bluffs, Ia.—The Atlantic Auto Co. has taken the agency for Ramblers for western Iowa. Other new Rambler agents are C. E. Schminke, Nebraska City; Joe Hayes, Central City, and the North Bend Auto Co., North Bend, Neb.

Stoughton, Wis.—J. Johnson is building a large public garage at this point and will become a district representative of the Hokanson Automobile Co. of Madison, Wis. The Hokanson company has nearly a dozen branches in western Wisconsin.

Cleveland, O.—The Auto-Transit Co. has been incorporated with an authorized capital of $5,000 to buy and sell cars and to do a general renting business by Charlotte F. Griffin, Harry L. Byerly, Nettie M. Clevenger, Agnes G. Crosser and Clyde M. White.

Wilmington, Del.—The Wilmington Automobile Co. has taken the local agency for the Lozier car. The West Side Garage, Inc., whose establishment is at Third and Connell streets, has taken the agency here for the Metz car. Andrew Johnson is the manager.

Sioux Falls, S. D.—The Silent Sioux Automobile Co. intends to begin the manufacture of motor cars in Sioux Falls, and has purchased 20 acres of ground on which to erect a factory. There is a rumor that the Luverne Automobile Co., of Luverne, Minn., will consolidate with the other company, and that both cars will be manufactured here.

Corning, Ia.—Henry Knolla will open a new garage at Corning.

Osborne, Kan.—Turner & Burt have just moved into a new building, remodeled especially for their use.

Sandusky, O.—The Vim Motor Mfg. Co. has filed papers increasing its capital stock from $25,000 to $60,000.

Aberdeen, Wash.—J. B. Knight, manager of the J. B. Knight Auto Co., of Aberdeen, is now Winton agent in this territory.

Lincoln, Neb.—The Standard Automobile Co., of Lincoln, has moved from its old location on M street to a new one at 234 South Eleventh street.

Atlanta, Ga.—G. B. Dickinson, formerly with the White Star Auto Co., of Atlanta, has been appointed state agent for the Glide cars in Georgia, with headquarters in Atlanta.

Boston, Mass.—A. B. Henley, for the past 2 years manager of the Franklin branch in Boston, has resigned. The branch is in charge of O. B. Lawton temporarily.

Valparaiso, Neb.—The Valparaiso Automobile and Garage Co. is remodeling and adding an addition to its garage, so that when the building is completed it will be 48 by 64 feet.

Pittsburg, Pa.—M. Donahue, of the Whiting Sales Agency, has been appointed factory distributor for the Clark motor cars in western Pennsylvania, northern Virginia and eastern Ohio. He will have headquarters in Pittsburg.

Pittsburg, Pa.—The Coraopolis Motor Express Co. has let the contract for a garage, 40 by 75 feet, at Coraopolis, Pa., 12 miles down the Ohio river from Pittsburg. The company intends to operate large trucks between Coraopolis and Pittsburg and also will install a complete repair department.

Seattle, Wash.—Lozier cars, which were introduced in Seattle 2 years ago, will be handled exclusively hereafter by the new Lozier agency, which is in charge of T. A. Davies as manager and H. W. Smith, sales manager. The new concern will be housed in spacious quarters at 309 East Pike street.

Boston, Mass.—H. J. Koehler, of New York, who has the output for the Hupmobile, has opened an agency for the cars in Boston, with W. H. Shutt, formerly of the New York branch, in charge. At present the office is at 17 Ipswich street, but in a few weeks permanent salesrooms will be opened at 1074 Boylston street, near Massachusetts avenue, where a building is being remodeled especially for the company.

Talmage, Neb.—William Ritter has taken the agency for the Auburn.

Brooklyn, N. Y.—The Bonner Automobile Co. has opened a new selling branch at 1295 Bedford avenue.

Pittsburg, Pa.—H. M. Horner has gone to New Orleans, where he will open a branch of the Auto Trading Co.

Omaha, Neb.—The Omaha Tire Repair Co. is a new Omaha firm. It is located at 2201 Farnam street. Henry Nygaard and George Twoger are proprietors.

Eau Claire, Wis.—The P. J. Holm Co., manufacturer of gasoline engines and motors, has moved to larger quarters in the Bailey building, Water street.

Milwaukee, Wis.—The W. H. Hobbs Co. of Eau Claire, Wis., and the L. H. Hall Automobile Co. of Wausau, Wis., are among the 1911 Chalmers agents.

Philadelphia, Pa.—President F. C. Vanderhoof of the Olds-Oakland Co., 506-8 North Broad street, has secured the services of Charles M. Strieby and has appointed him sales manager of his company.

Seattle, Wash.—The F. H. Barshar Co., western Washington distributer for the Stevens-Duryea, has established a number of sub-agencies and also has appointed John Rockhill as the Marion agent at Dayton, Wash. This car is also represented in the state of Washington by the Barshar company.

Toledo, O.—When the additions now under construction at the Atwood garage are completed this will be one of the largest in the state. The new addition of brick and concrete joins the rear of the present quarters and will front on Horace street. The repair department will be centered in the new wing, leaving the older part entirely for the storage of cars and

Recent Incorporations

New York—Automobile Owners' Co-operative Co., capital stock $300,000; incorporators, Frank Hendrick, John T. McGovern and C. W. Gormly.

Syracuse, N. Y.—Syracuse Regal Auto Co., capital stock $5,000; to buy, sell, import and export motor cars and parts; incorporators, C. J. Travers, W. F. O'Connor and Otto Johnson.

Augusta, Me.—Auburn Garage Co., capital stock $10,000; incorporators, V. S. Darling, J. F. Hill and I. F. Eastman.

Boston, Mass.—International Automobile Association, capital stock $100.000; deal in motor car supplies; incorporators, W. T. Morgan and S. M. Booth.

Chicago—Henry Motor Car Sales Co., capital stock $25,000; to manufacture motor cars and other vehicles; incorporators, A. E. Dumang, C. F. Latimer and J. J. Maloney.

Wilmington, Del.—Courtney Tire and Rubber Co., capital stock $1,000,000; incorporators, W. N. Akers, W. J. Maloney and M. C. Taylor.

Houston, Tex.—Texas Automobile Co., capital stock $10,000; incorporators, R. R. Thompson, S. Myer and E. R. Richardson.